TWENTY-FOURTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

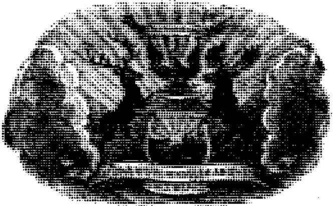
STATE BOARD OF AGRICULTURE

OF THE

STATE OF MICHIGAN

FROM

OCTOBER 1, 1884, TO SEPTEMBER 30, 1885.



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1886.

REPORT OF THE SECRETARY

OF THE

STATE BOARD OF AGRICULTURE.

AGRICULTURAL COLLEGE,
October 1, 1885.

'o RUSSELL A. ALGER,
Governor of the State of Michigan:

I have the honor to submit herewith, to your excellency, as required y statute, the accompanying annual report, for the year ending Sept. 0, 1885, with supplementary papers.

Very respectfully,

HENRY G. REYNOLDS,

Secretary of the State Board of Agriculture.

STATE BOARD OF AGRICULTURE.

HON. FRANKLIN WELLS, of Constantine,

PRESIDENT OF THE BOARD.

HON. THOMAS D. DEWEY, of Owosso,

VICE PRESIDENT.

HON. WM. B. McCREERY, of Flint.

HON. ELIJAH W. RISING, of Davison Station.

HON. HENRY CHAMBERLAIN, of Three Oaks.

HON. CYRUS G. LUCE, of Gilead.

HON. RUSSELL A. ALGER, GOVERNOR OF THE STATE, } *Ex Officio*
HON. EDWIN WILLITS, M. A., PRESIDENT OF THE COLLEGE. }

HENRY G. REYNOLDS, SECRETARY.

MERRITT L. COLEMAN, TREASURER.

As State reports are so often slightingly regarded, it may not be considered out of place to insert the following letter from W. R. Robertson, Esq., M. R. A. C., Fellow of the Madras University, Principal Madras Agricultural College, regarding the last report issued by my predecessor:

OFFICE, MADRAS AGRICULTURAL COLLEGE,
Saidápet, India, February 15, 1885.

TO ROBERT G. BAIRD, ESQ.,
Secretary State Board of Agriculture, Michigan, Lansing, United States:

SIR,—I have just seen your admirable report for 1883, and write to ask that you will be kind enough to favor me with a copy for the library of this college.

2. I may remark that this is the only Agricultural College in India, and that it is attended by students from all parts of the country, most of whom will be interested and benefited by a perusal of your report, which I venture to consider, after a very large experience of agricultural reports, is one of the best ever published.

3. I hope that we in this country may be able to follow in some respects the admirable example illustrated in your report.

4. I forward a copy of the last report of this college.

I have the honor to be, sir, your most obedient servant,
W. R. ROBERTSON, *Principal.*

ACCOUNTS OF THE STATE AGRICULTURAL COLLEGE.

FOR THE YEAR ENDING SEPTEMBER 30, 1885.

SECRETARY'S ACCOUNT.

		Dr.	Cr.
To balance on hand October 1, 1884		$427 28	
State Treasurer on account of Special Appropriations—			
Mechanical tools	$1,000 00		
Mechanical department	8,000 00		
Veterinary department	7,486 00		
Assembly hall and armory	5,000 00		
Greenhouse	600 00		
Farm department	3,694 50		
Horticultural department	871 00		
Chemical department	1,000 00		
Botanical department	1,515 50		
Zoölogical department	750 00		
Repairs of buildings	1,500 00		
Mathematical department	575 00		
Library	1,600 00		
Steam works	800 00		
Farmers' institutes	600 00		
Students' labor	4,000 00		
		38,992 00	
To receipts of institution on account of special appropriations—			
Botanical department	$15 00		
Zoölogical department	36 08		
Mathematical department	7 00		
Steam works	22 82		
Library	5 05		
		85 95	
To receipts transferred to special appropriation account—			
Library, special examination fees	53 00		
		53 00	
To State Treasurer on acc't of current expenses—			
Interest	$29,599 97		
Appropriation	4,192 50		
		33,792 47	
Carried forward		$73,350 70	

		Dr.	Cr.
Brought forward		$73,350 70	
To receipts of Institution on account of current expenses—			
Farm department	5,963 05		
Horticultural department	477 16		
Mechanical department	211 09		
Apiary	123 47		
Greenhouse	104 05		
Brick yard	121 75		
Interest on deposits	144 50		
Land sale	187 50		
Miscellaneous	199 79		
College dues, less $53.00, transferred to library account	4,609 16		
		12,141 52	
Room rent and incidental fees	$3,214 83		
Chemicals	569 90		
Matriculation	625 00		
Diplomas	147 50		
Special examinations not transferred	17 00		
Physiology	14 50		
Damages	20 43		
To College Treasurer, cash on warrants in excess of disbursements		188 41	
To deposits of students		1,779 00	
By College Treasurer, E. Longyear, cash deposits			$21,137 10
By " " M. L. Coleman, " "			65,854 07
By balance, cash on hand October 1, 1885			468 46
		$87,459 63	$87,459 63

SUMMARY OF TREASURER'S REPORT.

E. Longyear in account with Agricultural College.

	Dr.	Cr.
To balance October 1, 1884	$6,803 54	
Amounts received from State Treasurer and Secretary State Board of Agriculture, Oct. 1, 1884, to Feb. 27, 1885	21,137 10	
By warrants paid from Oct. 1, 1884, to Feb. 27, 1885		$20,222 69
Balance transferred to M. L. Coleman		7,717 95
	$27,940 64	$27,940 64

The above is a correct summary of my report to the State Board of Agriculture.

E. LONGYEAR, *Treasurer.*

M. L. Coleman in account with Agricultural College.

	Dr.	Cr.
To amount transferred from E. Longyear, Feb. 27, 1885	$7,717 95	
Amount received from State Treasurer and Secretary Board of Agriculture, from Feb. 27 to Oct. 1, 1885	65,854 07	
By warrants paid from Feb. 27 to Oct. 1, 1885		$54,252 98
Balance to new account, Oct. 1, 1885		19,319 04
	$73,572 02	$73,572 02

The above is a correct summary of my report to the State Board of Agriculture.

M. L. COLEMAN, *Treasurer.*

SUMMARY OF WARRANT ACCOUNT.

Disbursements on account of special appropriations—		
Professor's house	$539 57	
Assembly hall	2,386 48	
Horticultural department	118 29	
Farm department	2,213 29	
Botanical department	552 58	
Veterinary department	1,623 22	
Mathematical department	121 04	
Zoölogical department	228 23	
Chemical department	824 53	
Mechanical department	8,689 26	
Mechanical tools	363 15	
Library	1,436 54	
Repairs of buildings	1,374 61	
Farmers' institutes	300 05	
Water-works	45 80	
Boiler-house	1,086 42	
Steam works	704 03	
Students' labor	3,093 88	
Green-house	894 26	
		$26,595 18
Disbursements on account of current expenses—		
Salaries	$24,753 70	
Farm department	9,185 09	
Horticultural department	3,289 41	
Steam and fuel	3,675 04	
Repairs	1,449 76	
Carpenter shop	750 82	
Chemical laboratory	655 29	
Botanical laboratory	68 33	
Students' labor	327 37	
Secretary's office	555 06	
President's office	160 16	
Stationery	119 08	
Sunday services	130 00	
Sundry incidental expenses	3,416 31	
		48,535 42
Cash to Secretary in excess of disbursements		188 41
		$75,319 01
Two September warrants not cashed till October 1, 1885		843 34
Total warrants paid by Treasurer during fiscal year		$74,475 67

ACCOUNT WITH FARM DEPARTMENT.

DR.

To cash disbursements on account of—		
Farm house	$1,074 81	
Labor	1,711 81	
Team	339 58	
Cattle	5,249 05	
Swine	178 96	
Sheep	13 01	
Grain	110 09	
Seeds	38 27	
Wood	129 45	
Implements and repairs	256 77	
Office	83 29	
		$9,185 09

CR.

By cash receipts on account of—

Farm house	$455 36	
Labor	4 68	
Team	40 00	
Cattle	4,265 13	
Swine	501 86	
Sheep	281 28	
Grain	185 01	
Produce	51 85	
Wood	177 88	
		$5,963 05

ACCOUNT WITH HORTICULTURAL DEPARTMENT.

DR.

To cash disbursements on account of—

Green-house	$728 02	
Grounds	239 53	
Labor	939 07	
Board of men	291 84	
Team	568 56	
Vegetable garden and fertilizers	163 42	
Orchard, fruit garden, and vineyard	119 25	
Implements, repairs, etc.	153 87	
Ice	43 74	
Office	42 11	
		$3,289 41

CR.

By cash receipts on account of—

Green-house	$104 05	
Gardens	477 16	
		$581 21

SALARIES.

The salaries now paid are as follows:

President	$3,200 00
Two Professors @ $2,000 each	4,000 00
Six Professors @ $1,800 each	10,800 00
One Professor @ $1,500	1,500 00
One Professor @ $1,400	1,400 00
Two Assistant Professors @ $1,000 each	2,000 00
Secretary	*1,500 00
Assistant Secretary	600 00
Librarian	600 00
Foreman of farm department, board and $600	600 00
Foreman of horticultural department	750 00
Florist	750 00
Engineer	700 00
	$28,400 00

* Of this amount $1,000 is paid by the State Treasurer.

SUMMARY OF INVENTORY, SEPTEMBER 30, 1885.

College hall	$15,000 00	
Williams hall	45,000 00	
Wells hall	25,000 00	
Library and museum building	25,000 00	
Chemical laboratory	18,000 00	
Botanical laboratory	6,000 00	
Mechanical laboratory	7,800 00	
Veterinary laboratory	5,400 00	
Armory and assembly hall	6,000 00	
Farm house	3,500 00	
Four brick houses @ $3,000	12,000 00	
Two brick houses @ $3,500	7,000 00	
President's and two frame houses	20,728 00	
One frame house	4,000 00	
Herdsman's house	600 00	
Nine barns at Professors' houses, @ $300	2,700 00	
Horticultural barn and shed	1,100 00	
Cattle barn and shed	3,400 00	
Sheep barn	2,500 00	
Horse barn	3,000 00	
Piggery	2,000 00	
Brick work-shop	600 00	
Corn-house	500 00	
Green-house	9,500 00	
Feed barn	1,150 00	
Grain barn	1,600 00	
Tool-house	1,300 00	
Observatory	150 00	
Boiler-house and fixtures	5,000 00	
Ice-house	250 00	
Bee-house	280 00	
Twelve fire extinguishers	500 00	
College farm and park, 676 acres, @ $70	47,320 00	
Water-works	4,690 00	
Fuel on hand	722 50	
		$289,290 50
Farm Department—		
Cattle	$15,015 00	
Horses	1,550 00	
Sheep	1,139 00	
Swine	680 00	
Implements, produce, etc.	8,179 19	
		$26,563 19
Horticultural Department—		
Team, harness, etc.	$594 25	
Tools	810 70	
Vegetable garden	194 60	
Office	38 30	
Compost and manure	55 00	
Miscellaneous	83 75	
		1,776 64
Green-house—		
Plants	$3,200 00	
Furnaces and fuel	310 00	
Miscellaneous	481 75	
		3,991 75
Library—		
Books and pamphlets	$17,629 00	
Furniture	855 25	
		18,484 25
General museum—		
Collections and cases		11,140 00

Chemical department—		
Apparatus, chemicals, etc.		$11,435 25
Mathematical and engineering department—		
Telescope and class room apparatus		2,430 10
Steam works—		
Four boilers @ $600.00	$2,400 00	
Underground piping	2,700 00	
Pipes and fittings	636 38	
Tools for steam fitting	393 93	
		6,130 31
Mechanical department—		
Tools	$1,837 94	
Stock, lumber, etc.	442 69	
		2,280 63
Botanical department—		
Museum	$5,046 25	
Microscopes and other apparatus	1,429 38	
Furniture and fixtures	89 50	
		6,565 13
Williams Hall—		
Furniture		638 48
College Hall—		
Furniture		750 00
Secretary's office		382 80
President's "		240 45
Apiary—		
Bees, stock, and apparatus		323 00
Total		$382,422 48

A SUMMARY OF THE RESOURCES OF THE MICHIGAN AGRICULTURAL COLLEGE.

Farm, buildings, and equipments, as per above inventory	$382,422 48
Agricultural College trust fund from sale of lands of United States grant,	284,788 27
Balances due on purchase money " " " " " "	142,999 62
125,073.82 acres @ $5 per acre yet unsold " " " "	625,369 10
920 " " " " " " of swamp land grant	4,600 00
Total	$1,440,179 47

The present amount of the trust fund, is taken from the last line (that for 1885) of the fifth column of Table No. 2, page 13.

The balance due on purchase money is reported by the Commissioner of the State Land Office, and consists of the total amount for which the College lands have been sold up to the present time, *i. e.:*

The total of the tenth column in Table No. 1	$459,113 37
Less the payments made on these sales, constituting the trust fund	284,788 27
	$174,325 10
And less balances due on abandoned descriptions which have reverted to the State by forfeiture for non-payment of interest, as shown in column eleven of Table No. 1	31,325 48
	$142,999 62

The 125,073.82 acres yet vacant of the U. S. land grant are given in detail as located in the different counties in Table No. 6.

The 920 acres of swamp land is what still remains unsold of a grant from the State to the College of swamp lands located in the townships of Lansing and Meridian in Ingham county, and Bath and De Witt in Clinton county.

TABLE NO. 1.—*Agricultural College Lands, United States Grant, Record of Sales and Forfeitures to the Present Time.*

Year.	Number of Acres Sold at Original Sale. Acres.	Average Price Per Acre.	Amount.	Forfeited Lands Resold. Acres.	Average Price Per Acre.	Amount.	Total Sales. Acres.	Average Price Per Acre.	Amount.	Number of Acres Reverting by Forfeiture.	Aggregate of Sales less Forfeitures to End of Each Year. Acres.	Balance Remaining Vacant at End of Each Year. Acres.
1868	520.	$5 00	$2,600 00	....	....	....	520.	$5 00	$2,600 00	....	520.	235,153.37
1869	13,480.	3 19	43,000 00	....	....	....	13,480.	3 19	43,000 00	....	14,000.	221,673.37
1870	3,280.	3 44	11,280 00	....	....	....	3,280.	3 44	11,280 00	....	17,280.	218,393.37
1871	9,372.44	3 37	31,637 32	....	....	....	9,372.44	3 37	31,637 32	....	26,652.44	209,020.93
1872	20,580.25	3 19	65,660 75	....	....	....	20,580.25	3 19	65,660 75	....	47,232.69	188,440.68
1873	17,205.89	3 15	54,177 67	40.	$3 62	$145 00	17,245.89	3 15	54,322 67	40.	64,438.58	171,234.79
1874	2,039.95	3 20	6,519 75	40.	3 00	120 00	2,079.95	3 19	6,639 75	638.72	65,879.81	169,793.56
1875	4,798.99	3 08	14,796 97	40.	3 00	120 00	4,838.99	3 08	14,916 97	560.	70,158.80	165,514.57
1876	1,953.73	3 12	6,101 19	520.	4 38	2,280 00	2,473.73	3 30	8,381 19	1,758.40	70,874.13	164,799.24
1877	1,634.75	3 00	4,904 25	200.	3 00	600 00	1,834.75	3 00	5,504 25	1,438.06	71,270.82	164,402.55
1878	4,034.80	3 10	12,504 40	1,135.73	3 91	4,443 65	5,170.53	3 28	16,948 05	2,415.73	74,025.62	161,647.75
1879	6,782.12	3 02	20,506 36	1,318.06	3 08	4,054 18	8,100.18	3 03	24,560 54	1,978.11	80,147.69	155,525.68
1880	8,826.56	3 03	26,729 58	280.	3 18	890 00	9,106.56	3 03	27,619 58	4,926.33	84,327.92	151,345.45
1881	6,168.97	3 96	24,447 25	360.	4 33	1,560 00	6,528.97	3 98	26,007 25	1,987.19	88,869.70	146,803.67
1882	10,225.99	5 00	51,129 95	1,637.01	5 09	8,335 05	11,863.	5 01	59,464 90	760.11	99,972.59	135,700.78
1883	7,035.57	5 00	35,177 85	1,680.	5 03	8,448 00	8,715.57	5 00	43,625 85	560.	108,128.16	127,545.21
1884	1,846.01	5 09	9,390 05	526.45	5 38	2,832 25	2,372.46	5 15	12,222 30	200.	110,300.62	125,372.75
1885	704.88	5 74	4,044 40	119.52	5 67	677 60	824.40	5 73	4,722 00	525.47	110,590.55	* 125,073.82
Total	120,490.90	$3 52	$424,607 64	7,896.77	$4 37	$34,505 73	128,387.67	$3 58	$459,113 37	17,788.12	....	....

* See footnote to Table No. 6.

TABLE NO. 2.—*Agricultural College Trust Fund.*

Year.	Receipts of State Land Office on account of Principal for Agricultural College Lands sold.	Refunded on account of erroneous payments.	Balance transferred to credit of Agricultural College Trust Fund.	Aggregate to credit of Agricultural College Trust Fund at close of each fiscal year.
1868	$2,300 00		$2,300 00	
1869	11,865 00		11,865 00	$14,165 00
1870	5,895 00		5,895 00	20,060 00
1871	20,101 53		20,101 53	40,161 53
1872	33,621 93	$174 54	33,447 39	73,608 92
1873	29,583 47		29,583 47	103,192 39
1874	4,686 75		4,686 75	107,879 14
1875	5,399 24		5,399 24	113,278 38
1876	5,939 30	390 00	5,549 30	118,827 68
1877	2,337 22		2,337 22	121,164 90
1878	9,619 99		9,619 99	130,784 89
1879	8,590 53		8,590 53	139,375 42
1880	13,762 28		13,762 28	153,137 70
1881	20,341 18	60 00	20,281 18	173,418 88
1882	51,449 27		51,449 27	224,868 15
1883	34,482 28	825 90	33,656 38	258,524 53
1884	13,802 87		13,802 87	272,327 40
1885	12,460 87		12,460 87	284,788 27

NOTE.—Fifteen thousand dollars of above fund was invested from 1870 to 1871 in War Bounty Bonds and held by the College.

TABLE NO. 3.—*Agricultural College Interest Fund.*

Year.	Interest on Agricultural College Fund at 7 Per Cent; Paid by State Treasurer from Specific Tax Fund.	Interest from Purchases on Balances Due on Certificates for Part-paid Land, Less Refundings and Expenses for Appraisals, etc.†	Receipts for Penalty.	Trespass Collections.	Total accrued to Credit of Agricultural College each Year.	Amount Paid over to Treasurer of Agricultural College.	Balance remaining to Credit of Agricultural College Interest Fund at close of each Fiscal Year.
1869		$56 68	$2 28		$58 96		
1870	*$874 95	1,789 56	56 42		2,720 93	$2,779 89	
1871	§1,397 97	2,317 24	70 63		3,785 84	2,976 00	$809 84
1872	3,953 17	3,099 51	122 97		7,175 65	6,774 47	1,211 02
1873	6,040 33	4,907 77	110 96		11,059 06	12,238 48	31 60
1874	7,407 65	6,499 21	155 12		14,061 98	11,896 00	2,197 58
1875	7,717 24	6,552 93	125 97	$50 00	14,446 14	14,656 00	1,987 72
1876	8,124 31	6,692 47	306 64	1,706 75	16,830 17	18,817 89	
1877	8,396 64	5,726 58	189 64	860 00	15,172 86	15,172 86	
1878	8,740 62	6,405 26	247 21	414 00	15,807 09	13,320 61	2,486 48
1879	9,409 73	6,664 80	276 55	627 14	16,978 22	16,602 02	2,862 08
1880	10,240 28	7,393 23	148 73	115 00	17,897 24	17,799 15	2,900 77
1881	11,426 93	8,642 08	285 47	580 77	20,935 25	20,451 85	3,384 17
1882	13,957 04	8,345 45	204 96		22,507 45	25,891 62	
1883	16,741 38	9,141 30	200 96	4,659 96	30,749 60	26,139 13	4,610 47
1884	18,739 02	8,881 98	237 56	51 16	27,909 72	27,402 94	5,117 25
1885	19,645 33	9,121 14	329 06	674 87	29,770 40	29,599 97	5,287 68

* This amount was interest on war bounty bonds in which the fund was invested at the time.
§ $525 of this was interest on war bounty bonds in which the fund was invested part of the year.
† Refundings amounted to $352.27, ranging from nothing in 1880 and since to $145.21 in 1874. Appraisal expenses amounted to $836.19, ranging from nothing in 1872 to $120.23 in 1875. Advertising amounted to $611.43, ranging from nothing in 1870 to $218.35 in 1884. Trespass examination amounted to $4.00 in 1883.

AGRICULTURAL COLLEGE LAND.

Table No. 4.—*Showing by Counties the Amount of Agricultural College Land Sold at Original Sale during the Year ending September 30, 1885.*

Counties.	Acres.	Price.	Amount.	Amount Paid.	Amount Due.
Alcona	80.00	$5 00	$400 00	$400 00	....
Antrim	40.00	10 00	400 00	400 00	....
Charlevoix	40.00	12 00	480 00	120 00	$360 00
Montmorency	141.60	5 00	708 00	177 00	531 00
Oscoda	363.28	5 00	1,816 40	454 10	1,362 30
Wexford	40.00	6 00	240 00	60 00	180 00
Total	704.88	....	$4,044 40	$1,611 10	$2,433 30

Table No. 5.—*Showing by Counties the Amount of Forfeited Agricultural College Land Sold during the Year ending September 30, 1885.*

Counties.	Acres.	Price.	Amount.	Amount Paid.	Amount Due.
Kalkaska	39.52	$5 00	$197 60	$98 73	$103 87
Wexford	80.00	6 00	480 00	120 00	360 00
Total	119.52	....	$677 60	$213 73	$463 87

Table No. 6.—*Showing by Counties the Amount of Agricultural College Lands Vacant September 30, 1885.*

Counties.	Acres.
Alcona	22,120.67
Alpena	960.00
Antrim	3,200.93
Benzie	4,400.00
Charlevoix	3,725.09
Cheboygan	5,211.10
Grand Traverse	440.00
Iosco	26,874.97
Kalkaska	1,040.68
Manistee	6,160.00
Missaukee	799.64
Montmorency	7,804.30
Oscoda	14,880.79
Otsego	3,704.74
Presque Isle	400.00
Wexford	23,360.00
Total	*125,082.91

* The difference of 9.09 acres between this total and that given in the last column of Table No. 1, is owing to errors in fractional descriptions; the total in this table being the corrected one.

TABLE No. 7.—*Income of the Agricultural College from all Sources, from the Date of its Foundation to the Present Time.*

Year.	Appropriations for Current Expenses.	Appropriations for Special Purposes.	Land Sales, Salt Spring and Swamp Land Grants.	Interest from United States Land Grant.	Total
1855			$56,320 00		$56,320 00
1856					
1857	$40,000 00				40,000 00
1858					
1859	37,500 00				37,500 00
1860					
1861	6,500 00		152 25		6,652 25
1862	10,000 00		218 97		10,218 97
1863	9,000 00		407 80		9,407 80
1864	9,000 00		726 09		9,726 09
1865	15,000 00		1,156 61		16,156 61
1866	15,000 00		1,004 27		16,004 27
1867	20,000 00		7,608 38		27,608 38
1868	20,000 00		592 49		20,592 49
1869	20,000 00	$30,000 00	17,559 00	$58 06	67,617 06
1870	20,000 00		1,320 02	2,720 93	24,040 95
1871	18,250 00	10,500 00	4,135 72	3,785 84	36,671 56
1872	18,250 00	3,000 00	217 05	7,175 65	28,642 70
1873	21,796 00	15,602 00	10 13	11,059 06	48,467 19
1874	13,000 00	15,602 00	150 13	14,061 98	42,814 11
1875	7,638 00	7,755 50	144 53	14,446 14	29,984 17
1876	7,638 00	6,755 50	1,773 09	16,830 17	32,996 76
1877	6,150 00	30,686 80	979 06	15,172 86	52,988 72
1878	6,150 00	5,680 80	826 60	15,807 09	28,470 49
1879	4,971 80	16,068 32	712 22	16,978 22	38,730 56
1880	4,971 80	7,068 32	797 55	17,837 24	30,674 91
1881	7,249 00	43,720 50	461 95	20,935 25	72,366 70
1882	7,249 00	8,945 50	358 46	22,507 45	39,060 41
1883	8,385 00	23,793 00	391 95	30,749 60	63,319 55
1884	8,385 00	10,526 00	1,259 90	27,909 72	48,080 62
1885		35,103 00	187 50	29,770 40	65,060 90
1886		22,617 00		30,000 00*	52,617 00
Total	$362,083 60	$293,430 24	$90,561 72	$297,806 56	$1,052,882 12

* Estimate.

TABLE No. 8.—*Showing the Average Annual Expenses of Attendance at the Agricultural College.*

[*This table is computed for one year by dividing the total expenses of the four years' course by four. The different years vary slightly.*]	Highest Possible Cost.	Lowest Possible Cost.	Probable Cost to the Average Student.
Board for 36 weeks. This varies in the different clubs from $1.80 per week to $2.70 per week	$97 20	$64 80	$81 00
Room rent, heating, and water. This varies with the room and the number of occupants (1 or 2). The number of rooms at the lowest rates is quite limited	21 00	9 00	10 12½
Incidental expenses, including sweeping and lighting the corridors, and repairing and cleaning the dormitories	7 50	7 50	7 50
Text books, drawing instruments, etc	18 00	10 00	12 00
Charges in Junior Year in Chemical and Physiological Laboratories, $12.50	3 12½	3 12½	3 12½
Matriculation charge on entering the course, $5	1 25	1 25	1 25
Diploma on graduating, $5	1 25	1 25	1 25
Total	$149 32½	$96 92½	$116 25
Deduct wages received for labor. This may range as follows:			
In case of physical inability to labor	0 00		
In case the student faithfully performs all required labor			38 50
In case the student works 8 hours Saturday and 4 hours other week days		91 98	
Balance of cost per year, not counting vacation expenses, clothing, traveling, room furnishing, or other personal items, in round numbers	$150 00	$5 00	$77 75

This statement is not intended to lead young men to expect that they can go through this course without the help of money earned during the winter vacation.

The figures of the central column, while correct, are not likely to be often realized. The third column is the safest guide as to what to expect.

The following Advance Payments will be required of each new student on arrival:

	Highest.	Lowest.
Matriculation fee, to be paid but once for the whole course	$5 00	$5 00
Advance payment on account of board	20 00	10 00
Fee for incidental expenses, advance for one term	2 50	2 50
Room rent, advance for one term	7 00	3 00
Deposit required on issuing key to room	1 00	1 00
Amount necessary to furnish room	15 00	4 00
Total advance	$50 50	$25 50

SUPPLEMENTARY DATA.

The following statement is mainly quoted from my report to the Superintendent of Public Instruction for the collegiate year ending August 19, 1885.

The year has been one of great and important changes to the College, a transition period which has given much anxiety to its friends, but from which it promises to develop in continued vigor and usefulness.

Within this year it has lost its president, secretary, and two of its professors. It has had one entirely new department added to its course, and two more so much enlarged from their former dimensions as to be practically new departments.

November 24, 1884, Dr. T. C. Abbot tendered to the Board of Agriculture his resignation of the Presidency of the College. This step was one which, owing to failing health, he had for some time had in contemplation, and had previously informally announced to the Board. The following resolutions were drawn up by a committee of the Board, consisting of Governor Begole and Messrs. Chamberlain and Reynolds, and unanimously adopted:

Resolved, That in accepting the resignation of Dr. T. C. Abbot from the Presidency of the Michigan Agricultural College, the State Board of Agriculture desires to express its high appreciation of his labors in that position during the past twenty-two years, and its belief that these labors have been largely instrumental in bringing this College to its present high position among institutions of its kind.

We further take pleasure in the fact that the services of Dr. Abbot will not thus be lost to the Agricultural College, but that from a Professor's chair he will continue to help forward the cause of practical agricultural education in this Institution.

Dr. Abbot's connection with the College began Feb. 5, 1858, when he was elected to the Professorship of English Literature. On Dec. 4, 1862, he was made President.

At this same meeting of the Board of Agriculture, viz., Nov. 24, 1884, it was unanimously resolved that the Presidency of the College be tendered to the Hon. Edwin Willits, at that time Principal of the State Normal School. Jan. 8, 1885, this offer was accepted and the appointment formally made, and Dr. Abbot was elected Professor of Mental and Moral Science.

Owing to Mr. Willits' engagement with the Normal School he was unable to enter upon his new duties at this College at once, and the transfer was not made until July 1, 1885, till which time Dr. Abbot continued as acting President.

On August 4, 1885, after a severe illness of six months' continuance, Robert G. Baird, who had been Secretary of the Board and College since Aug. 25, 1875, died, and Henry G. Reynolds, of Old Misson, was elected to succeed him.

Jan. 1, 1885, James Satterlee, Professor of Horticulture and Landscape Gardening and Superintendent of the Horticultural Department since 1883, closed his connection with the College by resignation, and Liberty H. Bailey, Jr., was elected to his position.

The last annual report from this College contains a statement of the detail by the War Department of the United States of Second Lieutenant John A. Lockwood as Professor of Military Science and Tactics.

Lt. Lockwood entered on duty at once, and during the past year has organized a volunteer cadet corps of ninety members, most of whom have provided themselves with uniforms. These uniforms cost from $14.00 to $20.00, and

are not found to be an addition to the expenses of the students, as they simply take the place in cost of an equal amount in citizens' clothes.

Instruction in tactics and other military subjects has been given by lectures and recitations. The beneficial effects of the military training are seen in the more erect carriage of the students and in greater attention to neatness and promptness.

The Legislature at its last session treated us very liberally in providing, among other things, for four new buildings, as follows:

An Assembly Room for military drill, armory and general lecture purposes, brick, costing	$6,000 00
A Veterinary Laboratory, brick, costing	5,400 00
A Mechanical Laboratory, brick, costing	7,800 00
A dwelling for the Professor of Mechanics, frame, costing	4,000 00

The second of these buildings puts our Veterinary Department on a good working basis. It contains an operating room and lecture, dissecting and model rooms.

In the latter are skeletons of the principal domestic animals, sets of veterinary instruments and medicines, a life size model of the horse so arranged that it can be completely dismembered and exhibit all the internal organism, etc., etc. Our Professor of Veterinary, Dr. E. A. A. Grange, is under the law enacted by the last Legislature, State Veterinarian.

Under the appropriation for the establishment of a Mechanical Department at the College a new Professorship has been established which has been accepted by Prof. Lewis McLouth, formerly of the State Normal School, and a fine large building has been completed and equipped for the new Course in Mechanic Arts. In this building there is a complete blacksmith shop and brass foundry, supplied with benches, forges, tools of all kinds and a Sturtevant pressure blower, a gift to the institution from the generous inventor and manufacturer. There is also an iron working shop, 50x60 feet, furnished with an engine, seven engine lathes, a planer, a shaper, a power drill, emery wheels, benches, vises, and tools and machinery necessary to a complete shop. A fine turret lathe has just been completed by the students.

There is also a large wood-working shop, supplied with two lathes, a jig saw, benches, vises, and ten sets of carpenter's tools. Besides these there are offices, store-rooms, a large, well-lighted draughting room, a room for blue printing, a fine lecture-room for classes in mechanics, and a mechanical laboratory well supplied with apparatus.

The *Course in Mechanic Arts* will lay especial stress on Natural Philosophy, Drawing and Draughting, Mathematics, Surveying and Engineering, Book-keeping, Business Forms, and Law, Political Economy, and daily *shop practice* in wood and metal work.

The first two years of this course will be in outline as follows:

FIRST YEAR.

Autumn Term.—Shop Practice, Drawing, Algebra, English.
Spring Term.—Shop Practice, Drawing, Natural Philosophy, Geometry.
Summer Term.—Shop Practice, Natural Philosophy, English, Geometry.

SECOND YEAR.

Autumn Term —Shop Practice, Algebra, Drawing, Natural Philosophy.

Spring Term.—Shop Practice, Book-keeping and Business Forms and Law, Trigonometry, Natural Philosophy.

Summer Term.—Shop Practice, Drawing, Mechanics, Elementary Chemistry.

These two years of study will constitute an *Apprentice Course* in the Mechanic Arts, and it is believed will fit those who complete it to enter the manufacturing establishments of the State with such discipline of mind, of hand, and of eye, and with such knowledge of the principles underlying mechanical trades that they may soon become intelligent and expert workmen. An additional course of two years covering, it is hoped, something of the modern languages, the higher branches of Mathematics, of Engineering and of the other Sciences that bear upon the higher phases of mechanical industries will be arranged as soon as needed.

The course in Agriculture remains much the same as last year.

The following letter from the president of the Rose Polytechnic Institute is so concise and forcible a presentation of a question of vital importance wherever it is in contemplation to establish a school kindred to our own, that I take this method of preserving it for the use of those whom it will benefit.

It is on the question—

INDEPENDENT AGRICULTURAL AND TECHNOLOGICAL SCHOOLS *vs.* AGRICULTURAL DEPARTMENTS OF UNIVERSITIES.

ROSE POLYTECHNIC INSTITUTE.
PRESIDENT'S ROOM,
Terre Haute, Ind., February 15, 1885.

MY DEAR SIR,—I have yours of February 11 at this moment, and, as I have formed a definite opinion on the matter you discuss, will not delay an answer.

A school of technology, especially if its leading department is mechanics, unquestionably does better work when alone than when associated with other schools in a university.

I can only indicate some of the reasons for this—reasons drawn partly from experience and partly from the nature of things.

European experience is heavily in favor of separate establishments for technology; it is almost impossible to find there a strong university with a technological annex. Usually the universities and polytechnics are not found in the same towns.

In the United States, the first two schools of technology were at West Point and at Troy, each independent, and each still flourishing. The next were at Cambridge and New Haven, each joined to a college; the Lawrence school of Harvard University at Cambridge has become practically extinct, and the Sheffield school at New Haven has acquired a substantially independent foundation as a school of pure science.

Next in order come the institutes of technology at Boston, Hoboken, Worcester, etc., each heavily endowed and befriended by the most sagacious business men, who saw that independent schools of technology are what the times require.

The reasons drawn from the nature of things are cogent, but are specially convincing in the minds of those who have had intimate knowledge of the young men of the country. In all universities the fact is that the courses which lead to the highest literary degrees absorb the best minds, even to the depletion of the sections that enter the other courses. This at least is the explicit statement of some eminent university professors, and it is perfectly reasonable.

If purely literary courses and purely technological courses are placed side by side in a university, the *traditional* splendor of the one will cast a delusive glamour over it, so that young men whose real interests lie in the other are beguiled to a wrong choice.

There is no reason why courses in agriculture and in the mechanic arts should not flourish side by side.

Yours truly,

CHARLES O. THOMPSON.

AGRICULTURAL COLLEGE FACULTY AND OTHER OFFICERS.

Edwin Willits, M. A., President, Professor of Political Science, Constitutional Law, and Business Law.

Theophilus C. Abbot, LL. D., Professor of Mental Philosophy and Logic.

Robert C. Kedzie, M. A., M. D., Professor of Chemistry, and Curator of the Chemical Laboratory.

Albert J. Cook, M. S., Professor of Zoölogy and Entomology, and Curator of the General Museum.

William J. Beal, M.S., Ph. D., Professor of Botany and Forestry, and Curator of the Botanical Museum.

Rolla C. Carpenter, M.S., C.E., Professor of Mathematics and Civil Engineering.

Samuel Johnson, Professor of Practical Agriculture, and Superintendent of the farm.

Elias J. MacEwan, M.A., Professor of English Language and Literature.

E. A. A. Grange, V.S., Professor of Veterinary Science.

J. A. Lockwood, 2d Lieut., 17th U. S. Infantry, Professor of Military Science and Tactics.

Liberty H. Bailey, Jr., B.S., Professor of Horticulture and Landscape Gardening, and Superintendent of the Horticultural Department.

Lewis McLouth, M.A., Ph. D., Professor of Mechanics.

Henry G. Reynolds, M.S., Secretary.

Frank S. Kedzie, M.S., Assistant Professor of Chemistry.

Louis G. Carpenter, M.S., Assistant Professor of Mathematics.

Mrs. Mary J. C. Merrell, B.S., Librarian.

Henry W. Baird, B.S., Assistant Secretary.

Louis Knapper, Florist.

Charles S. Crandall, B.S., Foreman of the Garden.

SUMMARY OF STUDENTS.

Graduates	4
Seniors	32
Juniors	26
Sophomores	27
Freshmen	65
Specials	19
Total	173

Wednesday, August 19, the degree of Bachelor of Science was conferred upon 29 members of the Graduating Class, as follows:

	County.	Postoffice.
Edwin S. Antisdale	*New York,*	Nyack.
William S. Baird	Ingham,	Lansing.
Edward A. Bartmess	Berrien,	Buchanan.
Richard M. Bates	Barry,	Hastings.
Fred L. Chappell	Kalamazoo,	Cooper.
James Y. Clark	Oakland,	Orion.
Charles B. Collingwood	*Massachusetts,*	Boston.
James A. Dart	Emmet,	Petoskey.

	County.	Postoffice.
Hiram T. French	Van Buren,	Almena.
Harry P. Gladden	Ingham,	Lansing.
Elwyn T. Gardner	St. Joseph,	Centerville.
Robert W. Hemphill, Jr	Washtenaw,	Ypsilanti.
Theries D. Hinebauch	Kalamazoo,	Vicksburg.
Charles H. Hoyt	Barry,	Irving.
Edward R. Lake	Washtenaw,	Ypsilanti.
Glen C. Lawrence	Eaton,	Charlesworth.
John W. Matthews	Barry,	Hastings.
George Morrice	Ionia,	Pewamo.
Julius R. Newton	*South Carolina*,	Pendleton.
Lewis G. Palmer	Jackson,	Napoleon.
Truman L. Parker	Barry,	Carlton C'tre.
Wilbur I. Power	Oakland,	Pontiac.
George E. Sprang	Ingham,	Lansing.
Dorr J. Stryker	Berrien,	Dayton.
Harris E. Thomas	Barry,	Middleville.
James D. Towar	Ingham,	N. Lansing.
Perry G. Towar	Ingham,	N. Lansing.
Hubert M. Wells	Livingston,	Howell.
Frank M. Woodmansee	Barry,	Middleville.

The degree of Master of Science was conferred on Hon. Chas. J. Monroe, Chas. W. McCurdy and Eugene Davenport.

IN MEMORIAM.

HON. H. G. WELLS.

April 4, 1885, was a dark day to the members of the Michigan Agricultural College, for on that day the Hon. Hezekiah G. Wells departed this life.

Judge Wells was named in the law for the re-organization of the Michigan Agricultural College as a member of the State Board of Agriculture. This place he held, by renewal of his appointment by successive Governors, for a period of twenty-one years, then resigning because he was unable to attend to the duties of his office.

It is needless to say that from the first his opinions had great weight with the other members of the Board. They elected him their President, and continued him in that office to the last. He always gave unsparingly of his time and energies whenever they could help the College, and his large influence with the Legislature often secured appropriations to the Institution which, but for this influence, would have been lost.

While all departments claimed his attention, he took special pleasure in watching the improvement and adornment of the grounds. The labor system met with his earnest support and approval; on his death bed he expressed the

hope that nothing might ever happen to overturn it. The formation of a Ladies' department was very much desired by him, but this he did not live to see.

He was in truth a very father to the College—wise, patient, and active. Graceful and dignified in bearing, he was a man of whose very appearance we were proud

Judge Wells was born in Steubenville, O., June 6, 1812, educated at Kenyon College, read law in the office of J. & D. Collier of Steubenville, and was admitted to practice in 1832.

In 1840, and again in 1860, he was a presidential elector. President Lincoln tendered him the position of minister to Honduras, and President Johnson the place of consul to Manchester, England, both of which were declined.

In 1873 Governor Bagley appointed Judge Wells one of the eighteen commissioners to prepare and report a Constitution for the State of Michigan. This was prepared and submitted, and rejected by the electors. In August, 1862, Judge Wells raised in western Michigan the Twenty-fifth infantry, Michigan volunteers, Col O. H. Moore commanding. In June, 1874, he was appointed by President Grant presiding judge of the court of Alabama claims. This court held its sessions for the first two and a half years in Washington, and entered judgment in over 2,000 cases, distributing $9,316,120.25. General Grant, in his annual message in 1875 and 1876, commended in warm terms of praise the action of this court. Subsequently, when the court was re-organized, Judge Wells was again appointed presiding judge, but was compelled to resign, on account of ill-health, before the work of the court was completed.

He was a man of very fine personal appearance, of large acquaintance with leading men throughout the country, and possessed a most thorough knowledge of the country, its institutions, and the statesmen of the past forty years; a fine talker, one of the most interesting and instructive; a prolific writer, having contributed to the press many valuable articles on a great variety of subjects.

He was a model in his domestic life and in his habits of living. His was the culture of one who possessed the highest tastes and the noblest views of life.

INAUGURAL ADDRESS OF EDWIN WILLITS.

DELIVERED AUGUST 19, 1885.

This institution is 28 years old. May 13, 1857, the buildings and grounds were dedicated by the State Board of Education, with appropriate services, in the presence of the governor, several officers of the State government, and a large concourse of citizens from various portions of the State. It was the first Agricultural College on the continent. Other States had moved in the same direction, but Michigan forestalled all others in the enterprise of establishing an institution of learning whose sole object should be the intelligent investigation and application of subjects pertaining to agriculture and the education of young men into a higher and, if possible, better system of farming, as well as into a cultured, practical manhood.

The enterprise had been well considered. It was the creature of the Michigan State Agricultural Society, and to the persistent exertions of that body the State largely owes the prompt consideration given to the subject. As early as Dec. 19, 1849, at the second annual meeting of the executive committee of that society at Jackson, at which were present Gov. E. Ransom, F. S. Finlay, Bela Hubbard, Michael Shoemaker and others, it was resolved to interest the Legislature in establishing a state central Agricultural office, with which should be connected a museum of agricultural products and implements and an agricultural library, and as soon as practicable an Agricultural College and a model farm. A committee was duly appointed to memorialize the Legislature, and in January, 1850, Bela Hubbard, for the committee, presented the subject to the legislature in a well considered memorial, in which he set forth what special subjects ought to be taught and summed up the scope of such an institution by saying that there should be taught there "those branches of education which will tend to render agriculture not only a useful, but a learned and liberal profession, and its cultivators not the 'bone and sinew' merely, but ornaments of society."

Nothing came of the effort in the Legislature in 1850, but the sentiment had grown so strong in its favor that the constitution of that year required the Legislature, "as soon as practicable, to provide for the establishment of an agricultural school." At a meeting of the executive committee of said society, Dec. 14, 1852, Messrs. Dort, Shoemaker, and Moore were appointed a committee to urge upon the Legislature the immediate compliance with the provision of the new constitution relative to the agricultural school, advising that it temporarily be adopted as a branch of the University; but that its permanent location should not be established in immediate proximity to any existing educational institution but on a model and experimental farm of 640 acres. The subject

was presented to the Legislature of 1853, and while it was favorably received, it was not acted upon. In the meantime the State Board of Education had caused to be taught at the Normal school the elements of scientific agriculture, and the regents of the University had organized an agricultural school as part of the scientific course then recently adopted, and had announced a free course of lectures in the University upon agricultural science. The friends of both institutions sought to have the proposed "agricultural school" made a branch of the institution whose interests they sought to further. The discussion became quite animated and general all over the State, so that, when the executive committee of the State Agricultural Society met Dec. 12, 1853, the subject formed a prominent topic for action. After full discussion, on motion of Mr. Bartlett of Monroe, it was resolved "That an Agricultural College should be separate from any other institution," and a committee was to urge action upon the Legislature about to convene.

The result was that the Legislature by act of Feb. 12, 1855, established this college, providing that it should be located within ten miles of Lansing, the site to be on a farm of not less than 500 acres, to be selected subject to the approval of the State Board of Education, by the president and executive committee of the State Agricultural Society. The present site, then a virgin wilderness, three miles east of the city of Lansing, was, June 16, 1855, selected, and May 13, 1857, on this very spot, as near as may be, the new enterprise was dedicated.

It is instructive to read the literature, the addresses, and the plans of that time: to follow the hopes and great expectations, not fully realized as yet, the intelligent appreciation of the necessity for scientific agriculture, and the faith that great results would follow their labors. Gov. Kinsley S. Bingham said: "One of the highest objects to be attained by the establishment of an Agricultural college is to educate and dignify the character of labor." "A new era is dawning upon the vision of the farmer—a new light is illuminating his path, and a new interest and new pleasures are urging him on to improvement. His intellect comes to the aid of his hands, and he appreciates the full dignity of his chosen pursuit."

So with prayer and prophecy they laid the foundations of this institution. From the beginning it had two difficulties to contend with. The first, the unfortunate selection of the site so far as immediate results were concerned. The second the unsettled policy for years as to its independent status, or rather the constant demand that it should be made the adjunct of some existing institution, which, while it was not strong enough to accomplish its removal, to a certain extent crippled its efficiency and sharpened criticism.

It was a pioneer institution in the literal sense; not only was it the first of its kind, but it began at the stump, so to speak. The first tools needed were an ax to fell a tree and a spade to dig a well. It has gone through all the stages of pioneer life; it has had its corduroy roads, its chills and fevers, chills predominating; it was almost a generation "getting out of the woods;" so that its primal energies were in a sense wasted in subduing a farm, in taking a large tract of land in a state of nature and fitting it to become a "model farm" instead of taking improved land all ready for experiment. The result was that many of the promoters of the enterprise became impatient, then cool, and finally opposed to it. They could not wait. There was not much science, of course, needed in clearing land, and the critics looked in vain, as they said, for results, except financial ones, on the wrong side of the ledger. Their clamor brought on the stump puller before nature had had time to make stump pulling eco-

nomical, and so all along the line the board and the faculty worked at a disadvantage, but with heroic persistency they continued their efforts until the people begin to think the enterprise pays, not always in the direct sense of financial profit in the enterprise itself, but as we hope and feel assured, in the higher field as a promoter of scientific intelligence.

We will not spend time on the second disability encountered. It needs but a casual inquiry into the fate of all those cases where an agricultural school has been made an adjunct of a purely literary or scientific educational institution, to be convinced that sooner or later the agricultural feature is lost, or plays so subordinate a part as to discourage young men from entering it, and to dishearten those who had hoped that literature and science would illumine the path of the agriculturist. We will, before we close, attempt to explain why, logically, this must always be the result; suffice it to say that in Europe and in this country, those agricultural schools have prospered best that have retained their independent status.

But we have now passed the pioneer steps of our history, and we stand to-day well equipped for work, and better able to meet all just demands than ever before. Fair consideration of the past will demonstrate that this Agricultural College has been a potent factor in the dominion of scientific investigation and has done a grand work. Twenty-eight years ago this spot, now the center of a beautiful park of nearly 100 acres, with its outlying fields of fertile beauty, its sweeping drives and foot paths, its beautiful residences and stately structures, was a girdled clearing with its two or three college halls, the beginning of a future full of hope, and a future not without its victories and substantial results. In the years that have intervened nearly 2,000 students have entered its halls, 360 have graduated, and all, whether they have stayed months or years, have gone forth with a purpose ennobled by their associations here, and the larger proportion of them have in the following years adopted agriculture as a profession. Of the graduates over 50 per cent of them are farmers or in kindred pursuits. Sixteen are professors or instructors in agricultural colleges, north and south, east and west. One is the president of an agricultural college. Another has almost from its foundation been a member of the Illinois industrial university, and is now president of the board. There is not a professional school, either of law or medicine, in the country which can show a larger percentage of graduates who finally follow the profession therein taught, and this notwithstanding the fact that many have entered the Agricultural College with the avowed intention of not following agriculture as a life pursuit. The doors have not been barred against such, for the reason that even these in their respective spheres in life will be instinct with agricultural tendencies, and will be active promoters of agricultural science.

So much in rapid sketch of what this college has been; now a brief outline of what it is and what it has facilities for doing. Remark has been made of the beautiful park that lies around us. It is an open book for the daily instruction of the student, with nearly every tree and plant that can be grown in this climate duly labeled, with its lesson in landscape gardening the daily study of teacher and pupils, all an educator of refined taste, and a practical exemplification of what tree and shrub, lawn and drive can do in adorning a home.

THE FARM.

Extended practical instruction is given upon land drainage, rotation of crops, the proper cultivation of crops, the management of manures, care of farm

premises and implements, breeds of domestic animals, their characteristics and adaptations, the feeding of animals, marketing, farm accounts, farm law, etc. Theoretical instruction is supplemented, illustrated and enforced by the actual working of a farm of 600 acres, with improved buildings, implements, and the various breeds of stock.

It is the purpose of the board of agriculture to have the farm managed in accordance with the best methods; to emphasize the value of order and system in all farm operations by example; to furnish a certain quota of students labor, 10 to 15 hours each week; to give all students who desire, and make the right use of their opportunities, some knowledge and skill in most of the details, the fundamentals of farm practice.

As far as time and means will permit a portion will be used for experimental work, the testing of new grains and grasses, while the feeding of the different breeds of animals will receive attention.

THE BOTANICAL DEPARTMENT.

The botanical laboratory and museum of vegetable products with the needed rooms occupy the whole of a fine gothic building 46x66 feet, two stories high, with a gallery above. The rooms contain many of the most recent and valuable works on botany, a fine herbarium, including mosses and fungi; a collection of seeds, grains, grasses, fruits and preparations ready for study; the state collection of forestry products shown at Philadelphia and New Orleans, for which diplomas were given. The laboratory contains a large number of good compound microscopes with much useful accessory apparatus.

With an arboretum of 200 species, a botanic garden of 700, green-houses containing 1,000 species and varieties, the parks, gardens and orchards many more, the botanical department is rarely at a loss for any kind of material for study and illustration.

In 1884 an eminent eastern professor of botany who had studied in Europe and visited the best laboratories, described their apparatus which was no better than that now used at this college. In a scientific journal he includes Michigan Agricultural College among the list of four colleges which "had taken the initiative in introducing needed reforms, and already a most promising crop of fruit is the result."

The botanical department by its testing of vegetable and grass seeds has without doubt been largely instrumental in improving the quality of those offered in the markets; and the demonstration by a long and successful line of experiments in crossing plants grown in one place with those of the same variety raised in a distant locality, that the product is thereby largely improved in quality and amount, has met the approval of scientists, and scientific journals, and will in time be productive of substantial results whose value cannot well be measured, while the future of the 175 kinds of grasses grown in the grass plats of the botanical garden is of a promise that may well challenge competition in this country with its great variety of soils and climates. It is with great pleasure that we note the fact that the botanical department of the Agricultural College has placed itself in the front rank for scientific research, for original investigation and in the facilities offered to students in its regular course of one and one-half years.

THE CHEMICAL DEPARTMENT.

The chemical department with its laboratory of 18 rooms, a lecture room

with seats for 150 students, with two rooms for chemical analysis and desk space for 68 students, with two rooms for quantitative work and original investigation, affording space for 20 additional students, with its choice and extensive chemical and physical apparatus, affords a rare opportunity for students in chemistry and allied sciences. In place of the traditional "one term in chemistry with experimental illustrations," the course in chemistry at this college extends through two years. The students not only witness the experiments in the lecture room, but they have the opportunity to repeat and vary them in the working laboratory. The apparatus is not designed for cabinet show, but actual use at the work tables, and the students get the benefit of this.

Of the work performed by the chemical department for the public good I need not speak in detail because it is everywhere recognized. Agricultural societies, farmers' clubs, granges, pomological associations, as well as private citizens have learned of the college laboratory. When any knotty point comes up for solution or any special subject demands investigation and careful research they instinctively look to the chemical department for aid. Year in and year out the chemical laboratory has been a scene of busy industry in promoting the public weal. The farm, the garden and the home have been the better for these labors. The representative farmers' association of the State recognized the value of this work when it said in regard to one special investigation by Dr. Kedzie: "It has saved to the farmers of this State more than the Agricultural College ever cost."

THE DEPARTMENT OF NATURAL SCIENCES.

The department of anatomy, physiology, and zoölogy is now very thoroughly equipped The attractions in geology, zoölogy, and anatomy are extensive, and have been selected and arranged with special reference to imparting instruction. The collections in entomology are specially valuable, and the department of economic entomology has had special consideration. In the museum and collections there is not only a manikin, but skeletons of all classes of vertebrates, models of the lower animals, and special organs, which in connection with labratory work—dissections and the study of sytematic zoölogy—makes the course very complete and gives admirable opportunity for post graduate study. The laboratories are large and convenient, and are always open for the accommodation of students.

Thorough and extensive dissections are made which give the students an accurate knowledge of anatomy. Great pains is taken to acquaint the students thoroughly with human anatomy and physiology, and without question the fullest and most practical instruction is given in entomology to be found in any general college course in the United States.

This department includes anatomy, human and comparative; physiology of man and the lower animals; entomology, structural, systematic and economic, the latter embracing agriculture and injurious insects; general zoölogy which considers morphology and systematic zoölogy, and a brief course in geology. A large collection of injurious insects and a well equipped apiary affords excellent opportunity to illustrate the course in practical entomology.

THE VETERINARY DEPARTMENT,

recently established, promises to become of prime importance in consequence of the large interests engaged in stock raising, and the prevalence of communica-

ble diseases among animals. With eighteen states at this hour quarantined against the stock of other states in consequence of these diseases, it is important that we should have men educated specially in veterinary science; that we have in considerable numbers persons skilled in the diseases of domestic animals, and that we no longer depend upon the limited acquirements of the old fashioned "horse doctor." The last Legislature, with commendable liberality, has afforded the college the means to erect a building especially devoted to that science, with a museum and lecture room, with operating rooms and dissecting tables, with manikin and skeletons and all the apparatus needed to illustrate the subject as fully as the best medical colleges illustrate the subjects of the diseases of the human body. All the students in the agricultural course receive instruction in this science, and their interest in the lectures fully indicates their appreciation of their importance. It is worthy of consideration whether a short special course of two years in that and agriculture combined, with the requirement of an advanced antecedent general education, might not meet a popular demand; a course that would be above "quackery" and still within reach of many who cannot devote four full years to get what they want; a course that would send out men who could write a prescription without misspelling, and indite a common business communication in good English.

THE MILITARY DEPARTMENT,

also recently established, promises to be productive of good in an exercise and drill that far excels in beneficial results all that can be claimed by the best conducted gymnasiums. With a competent instructor detailed by the war department, with arms and accoutrements and ammunition donated by the United States, the military feature bids fair to be attractive and useful.

THE DEPARTMENT OF MECHANIC ARTS.

The college, as before remarked, was established by the State purely as an agricultural school; its sole intent was to promote scientific agriculture. In 1862 the general government donated, under certain conditions, to each of the States 30,000 acres of land for each senator and representative in congress for the "endowment, support, and maintenance of at least one college, where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts."

Under this act the State of Michigan received about 236,000 acres of land, a little less than the round sum to which it was entitled, in consequence of the shortage by actual survey of the sections donated. The State accepted the grant and in good faith promised to execute the trust. The grant was turned over to the Agricultural College already established. By the terms of the grant one of the functions of the trust was instruction in the mechanic arts, as imperative as that in agriculture, but inasmuch as the agricultural course was already in full operation and the fund from the grant was slow in accumulating, no effort was made until recently to comply with the full conditions of the gift. Last winter the Legislature was appealed to for means to erect the buildings and furnish the equipment (which under the terms of the grant could not be taken from the fund) for the department of mechanic arts. The response was hearty, and an appropriation ample for the initiative of the new course was

made, and the necessary shops are now being erected and the equipments being purchased.

The time is now propitious for the new department. It was hardly practicable to establish it sooner. There was no great public demand for it. The grant was in fact in advance of general public sentiment, but the leading spirits who advocated the land grant saw that in the near future, industrial education, in all its phases, would be a leading factor in our educational system and that, as the mechanical industries grew, instruction in the mechanic arts would become the subject of a live demand. It is so to-day. It has the platform for legitimate deliberative discussion, and all over the country the best equipped minds and the brightest intellects are engaged in this, to us, new leading topic. Continental Europe, older in these industries, long since saw the necessity for special attention to the matter, and during the last fifty years has expended large sums in schools of technology, and the promotion of sciences lying at the base of all the industries. The result has been marvelous. England, that once ruled the industrial as imperially as she did the commercial world, at last became anxious over the competition of nations that for half a century or more have been her lavish purchasers, and began to inquire how this ability to compete in her manufactures had been brought about, and was, after a full investigation into the primal causes, compelled to admit that it was to be attributed, more than anything else, to the schools of technology and mechanic arts, which those countries had had the foresight to establisb. England following the lead of her doctrinaires had adhered to the policy that the public should not be called upon to foster professional schools, but that all such, whether learned or industrial, should be the creations of private enterprise, supported by th [illegible]r patrons. The idea was that if there was sufficient demand for them, there would naturally be ample means and patronage for their establishment. But experience has shown that such is not the case. The plant for such institutions is costly, and the profit uncertain, hence private capital was slow in its investment in such enterprises. Education of any kind is always costly, and if made general, all experience shows that in a large measure, it must be sustained by the State. But this was of a class far more costly than the so-called liberal education. It takes time to establish and develop it. Continental Europe was nearly fifty years in experimenting and in so doing spent vast sums of money before the results heretofore mentioned were reached.

But there is an additional reason why such institutions are necessary here. In America the industrial arts are in their infancy, and we are brought face to face with the full-grown industrial organizations of Europe, with which we must compete. Mechanical science has now reached such a stage of development that the mere artisan, that is, the man who devotes his whole time and energies to the manual labor of his employment, will rarely have a comprehensive knowledge of the indnstry he seeks to promote. Then again, the division of labor is so great that a majority of the laborers know only one thing, or perform only one operation in the many that go to make up the product, and know nothing of the general principles. The laborer becomes a machine if confined to the machine, and while the industry gains in the one direction by the skill of the human machine, it loses in the other the intelligent inventive genius of the man of observation, thought and experiénce. Further, the day of the old-fashioned apprenticeship is ended, or practically so, when the young man was bound to serve from 14 to 21 and the master was bound to teach all the principles and the arts of the industry, so that with the experience of seven or

more years, and the general knowledge picked up here and there he became a mechanic well-versed in all the principles and details of his profession.

Our industries are an important factor in our body politic; not the controlling one, but a tremendously powerful one, and our future is to be largely shaped by our ability to manufacture as well and as cheaply as any one else. To do this we must put intelligence into our shops and theoretical instruction into our schools. We must occupy this ground ourselves, with our own brains and muscle. Two-thirds of our foremen and master mechanics are foreigners, educated in the technical schools of Europe, or instructed by an apprenticeship, which is not germane to our institutions. An apprenticeship is considered by our young men but a remove from serfdom, and the only chance we have for success is to import our skilled mechanics or educate them here.

Hence there is a place, and a large and well-defined one, for schools of technology; *institutions where may be taught the sciences upon which our industries* depend. The mere shop is no place for this instruction; there is neither time *nor opportunity to discuss the general principles upon which the industry is* based. There should be some place or institution capable of making an intel*ligent mechanic; intelligent in all the principles of mechanics, in the law* of motion, of sound, of light, in the kinds and strength of material, of friction, inertia, electricity, steam, chemistry, with just enough of the manual training to demonstrate the principles. Such a mechanic with this knowledge can step into a shop and in a short time distance the man who has no schooling in these principles; he can sooner acquire the skill in his profession, and it will be of more service in that his intelligence goes with it hand in hand.

The object of our new department of mechanic arts is to supply this want. Our purpose and wish is to take the young man who has an aptitude and taste for mechanical industry from the shop, give him a thorough course in drawing and design, thorough instruction in all those general principles which he cannot obtain elsewhere. for the reasons heretofore stated, give him daily practical work in the shop, and then return him to the shop, with a skill competent to take his place as a journeyman, and an intelligence fitting him for foremanship; with a moral purpose not above working at the bench or the forge, and yet with a capability of handling men and affairs. Such a man will as journeyman be the first to be engaged and the last to be discharged; such a man is on the high road, through the shop, to the head of his industry, a journeyman with the germ and possibilities of a master mechanic. We do not seek to make men "bosses." Our industrial foremen are a little shy of the "college-bred mechanic," for the reason, as they say, "he is apt to have the big head." But that depends upon the college at which he is bred. We grant you that the tendency of the regulation college whose purpose is a general and so-called liberal education is to breed, to use the words of another, "a sort of contempt for manual labor and the man who performs it, and to give its students very stilted notions about *culture and the exalted character of the work they must* do because, forsooth, they are graduates." Such a man "is not calculated to blossom out into the *common-sense, aggressive, enterprising young American, who is ready to do* anything honorable until something better offers, and who is sure to make his *way in the world." Is it possible to have a college that shall educate the scholar* and yet save the artisan; that shall make the man of culture and yet preserve the farmer? We believe it is, and that the Agricultural College of Michigan is such an institution. This leads us fully to consider finally the general purposes of the college. The first one we will note is that it seeks to foster and encourage

THE INDUSTRIAL IMPULSE.

The country is full to repletion of lawyers, doctors, clerks, agents and brokers; a percentage, honest, worthy, able, laborious gentlemen, ornaments to their profession, but a large proportion living by their wits, jugglers in the strict sense of the term, making a precarious living, seeking, some of them, to wear clean clothes at the expense of a clean character, all of them desiring to live without work. We have enough of such. As a rule they have a hard time, and did they but know it, a little hard manual labor would be a tonic to their manhood. But in the first place they are shirks naturally, and in the second place they have had associations that have led them to believe that manual labor is degrading. Mere drudgery, we grant you, in any line of business is never an ennobling pursuit, but to say or believe that intelligent manual labor is degrading is a reflection on the Divine mind that created hands as well as brain. They go together. Drudgery without intelligence is slavery; manual labor with intelligence is freedom. Whatever interests a man has growth in it. Greek roots have made some very small men, the other kind many large ones. There is health and vigor in knowing how to do something; there is better health and more manly vigor in doing it. A man with a trade has a moral capability; it is a fence around his energies to keep off trespassers. The Jews used to say: "He that teacheth not his son a trade, doeth the same as if he taught him to be a thief." You give a man something for his hands to do and you have taken hostage for good citizenship. The habit of daily toil is a better conservative of the peace than a paid constable. Our prisons are filled with loafers, our poorhouses with beggars and our politics with demagogues, gravitated there for the want of the little moral purpose lying behind a good day's work.

So we believe that the best legacy one can leave to a son is a willingness to work. We believe that that institution is the best that not only teaches the law, but teaches a trade; that not only teaches a science but what to do with it; that teaches the application with mind and heart and hand; that teaches that all labor is honorable; that trains the hand as well as the intellect. There is a moral influence around institutions as well as surrounding men; they have character as well—no two alike. The air is full of the predominating purpose. A true normal school is full of the teachers' work; instructors talk about it, students write and orate about it. So with a law or medical school, each is filled with a pervading strength—a predominating sentiment which gives character to the institution and to the students. To a like degree is it true that an institution where at stated times all work with their hands, will turn out students that believe that manual labor is not dishonourable, that take pleasure in robust work directed by intelligence. Such an institution has such *morale* in it and about it that young men will leave its halls and enter the shop or go to the farm with no sense of humiliation or disgrace, capable of managing affairs of state, and of putting their hands to work at anything worth doing. Now, it stands to reason that a man so educated is a better man, a more symmetrical man, a more capable man, than if he went out into the world with false notions, of life's duties and life's labors. It is the little rudder that guides the large ship that without it would go upon the rocks; so it is this moral purpose that lies behind a man's forceful energies, to use them well and honestly that saves many a strong nature from shipwreck.

We believe this college has the power to make just such men and we proclaim to all the world, that we do not want a young man that is ashamed to work

with his hands as well as his brain. If he can accomplish more by brain work after he leaves us, well and good, we do not object; but whether he can or not, he will not feel above work in the shop or on the farm. He will do that cheerfully because he will feel there is no disgrace in it. That is the initial point in the character of the young men we seek to send out. We want no loafers here and we shall mourn over every loafer who carries our degree with him into the busy world to which we accredit him. Therefore, we ask the people of this goodly State to consider the matter, and if they wish their sons to come to us we will try to equip them in mind and body, and to send them back with this industrial purpose.

The second general purpose of this college is to make it an institution of

APPLIED SCIENCE.

The sciences deal with the *non ego*, more directly with that great world outside of the personality of the individual, first with the facts and then the laws of the material universe, and thus they garner a harvest of comfort and material wealth that is so obvious and so charming and so delightful to the senses, that in this practical age we acknowledge their utility. Therefore the practical man and the so-called practical sciences demand a premium. Practical men are paid the highest wages. The theoretical man who develops the principles of a science is not to be ignored, but it is the man who can apply the principles evolved by the man of theory that commands the situation. This, therefore, is the age of applied science. Applied to commerce, manufacturing, and all the varied industries of modern life. The world's progress is measured by the bounds of its applied sciences and its prosperity by the amplitude of the practical arts. For this reason we have the demand that our system of education shall include both theory and its applications, and that the State shall furnish both.

In the line of this demand the State of Michigan has formed this college, and the United States has largely endowed it. For every science taught we have the amplest facilities for its application. For agriculture, the farm; for chemistry, laboratories and apparatus for the most minute and the most extensive analysis; for botany, the museum, the greenhouses, the botanical gardens; for the natural sciences, a well-stocked museum and apparatus and operating tables; for landscape gardening and horticulture, the park with all its varied beauties; for military tactics, a large drill room and armory, and muskets and accoutrements; for veterinary, a museum and operating rooms; and for the mechanical arts, large and fully equipped shops, with engineering, mathematical apparatus, and with a complete line of apparatus to illustrate the physical sciences. In all these departments, not only are the theories taught, but the application goes hand in hand with the principle; skill and knowledge go together. There is no institution in this land that more fully than this realizes the ideal of the new system of education, "the teaching how to do by doing" At every step the application enforces the principle. It, therefore, goes without contradiction that a student that has taken this course not only knows as much as, but can do more than, a student that has only the theoretical instruction. In this regard we are justified in claiming for this institution a practical as well as a thorough education. It is not merely a school of observation and instruction, but a school where the students work in all its departments; on the farm, in the park, in the garden, in the laboratories and museums, on the drill ground, at the dissecting tables, and in the shops. The students are an important

working factor in all branches taught and demonstrated here, and in the end it must tell in the more enhanced prosperity of our State.

The third and last general purpose we will note it is hard concisely to state. It is expressed, perhaps, the best by saying that the college is

AN EXPERIMENT STATION.

Experiments are constantly being made in all the departments. Many are inconsequential and useless; many never see the light of day, but all contribute to the general knowledge of the subject. It is as important to know of a failure, and if possible its cause, as of a success. There has been in the country at large disappointment over the meagreness of the results in agricultural experiments up to this time. An impartial consideration of the matter would disarm most of the criticism. The failure lies in the nature of the subject. There is an incertitude in agriculture that does not exist in the exact sciences. Such is the variety of seed, soil, and climate; so inconstant is the weather; so many perils of water, drouth, and insects beset the paths of the agriculturalist between seed time and harvest, that no man can predict with assurance the result of his labors, and no experiment can promise absolute success in all places and by all persons. The consequence is that a large range of experiments is necessary with a more extended range of years; but of the grand aggregate result there can be no question. The introduction of a new variety of seed may in a single year pay well the expense of all the experiments in the past. It is only by trying and testing that the best is found, or the bad eliminated. It is to be hoped that Congress will pass the bill appropriating funds to make all the agricultural colleges experiment stations, and that thereby these colleges may have an assurance of permanent means systematically to follow for years a line of practical experiments. This college, as has been noted, has not been barren in these results, and the promise may be safely given that in the future it shall, if possible, improve on them.

Gentlemen of the Board of Agriculture and Ladies and Gentlemen:—This institution has closed another year of its existence. To-day has gone forth with the seal of our approval a class of young men who are to justify by their deeds the expense and labor here bestowed upon them. The impression may obtain from the fact that so much has been said about the material facilities here furnished for an education, that but little care or stress is laid upon the general culture of our students. Nothing is further from our intention. We cannot be oblivious to the fact that the man exists before the farmer or the mechanic, and that every system of education to be harmonious and complete must include that general culture that forms so important a function in life's work. We must not and we do not forget that, pure English, sound logic, a wide range of historical reading, a thorough knowledge of the fundamental and business laws of the land, and well-defined views of political science and mental and moral philosophy are necessary elements in a practical education. For all these ample provision has been made. But above and beyond all we should remember that morality, virtue, and religion are the corner-stones of a true character, and that this institution should inculcate pure morals and the highest virtue, and should exemplify in the fullest sense our daily obligations to our Divine Benefactor. It is for us of the administration to assure the people of the State, that by our example and by our precept we will be true to the higher duty, and that so far as in us lies we will preserve this institution free from the contamination of vice, and will send out from our halls the young men committed to our charge not only uninjured by their associations here, but better fitted to become good, loyal Christian citizens.

LAWS RELATING TO THE COLLEGE.

CONSTITUTIONAL PROVISIONS.

The Agricultural College of the State of Michigan was established in obedience to a requisition of the Revised Constitution of the State, adopted 15th August, 1850, which requisition may be found in Art. 13:

"SEC. 11. The Legislature shall encourage the promotion of intellectual, scientific, and agricultural improvement; and shall, as soon as practicable, provide for the establishment of an agricultural school. The Legislature may *appropriate the twenty-two sections of Salt Spring Lands now unappropriated, or the money arising from the sale of the same, where such lands have been already sold, and any land which may hereafter be granted or appropriated for such purpose, for the support and maintenance of such school, and may make* the same a branch of the University for instruction in agriculture and the natural sciences connected therewith, and place the same under the supervision of the Regents of the University."

ACT OF ORGANIZATION.

The *act of organization of the* State Agricultural College was approved *February 12, 1855, and provided:*

1. That *the president and executive committee of the State Agricultural* Society be authorized to select, subject to the approval of the State Board of Education, a location and site for a State Agricultural College.

2. To be within ten miles of Lansing.

3. Not to cost over $15 an acre.

4. The conveyance to be made to the State.

*5. Appropriated twenty-two sections of Salt Spring lands for the purchase of lands, erection of buildings, etc.

6. The College was committed to the charge of the State Board of Education.

7. Detailed objects of instruction; the date of beginning and end of each of the two scholastic terms of the year; provided for manual labor; that tuition should be free.

8. A treasurer was to do the work now done by the secretary of the College.

ACT OF REORGANIZATION.

An act of reorganization was approved March 15, 1861, by which a State Board of Agriculture was created and the care of the College placed in their hands. As amended the law now stands as follows, references being to Howell's Annotated Statutes 1882 and the laws of 1883 and 1885:

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*The minimum price for these Salt Spring lands, $56,320, was paid over at once to the State Board of Education for the College.

CHAPTER 194.

THE STATE AGRICULTURAL COLLEGE.

State board of agriculture established. § 4977. (3532.) *1861, p. 307, Mar. 15, Act 188; Am. 1871, p. 301, April 17, Act 180; 1873, p. 194, April 24, July 31, Act 145.* SECTION 1. *The People of the State of Michigan enact,* That a board is hereby constituted and established which shall be known under the name and style of the "State board of agriculture." It shall consist of six members besides the governor of the State and the president of the State agricultural college, who shall be *ex officio* members of the board; the governor, by and with the consent of the senate, on or before the third Wednesday of January of each biennial session, shall appoint two suitable persons to fill the vacancies that shall next occur, which vacancies shall be so filled that at least one-half the members shall be practical agriculturalists. **Members, and how appointed.**

Body corporate. § 4978. (3533.) SEC. 2. The State board of agriculture shall be a body corporate, capable in law of suing and being sued, of taking, holding and selling personal and real estate, of contracting and being contracted with, of having and using a corporate seal, and of causing to be done all things necessary to carry out the provisions of this act.

Vacancy. § 4979. (3534.) SEC. 3 Any vacancy in the said board, caused by death, resignation or removal from the State, may be filled by a majority of the members. A majority shall be a quorum for the transaction of business. The members of the board shall receive no per diem compensation for their services, but shall be paid their traveling and other expenses while employed on the business of the board. **Compensation.**

Meeting of the board. § 4980. (3535.) *Am. 1873, p. 194, April 24, July 31, Act 145.* SEC. 4. They shall meet quarterly at stated times at the State agricultural college, and may meet at such other times and places as they may determine.

President. § 4981. (3536.) SEC. 5. At their first meeting the members shall choose one of their number as president of their own board.

Secretary and treasurer. § 4982. (3537.) SEC. 6. At their first meeting, or as soon after as a competent and suitable person can be obtained, they shall choose a secretary of the board. If chosen from their own number, a vacancy shall be thus created in the board. A treasurer shall also be chosen, at their first meeing, who may or may not be from the members of their board, as they shall determine. They shall take such bonds from the secretary and treasurer as shall be deemed adequate to secure the faithful performance of their duties by those respective officers. The secretary and treasurer shall be chosen biennially, and shall hold their offices for two years from the last Wednesday of February, or till their successors are chosen. **Bonds.**

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§ 4977. "An act to re-organize the agricultural college of the State of Michigan, and to establish a State board of agriculture:" No. 188, Mar. 15, 1861, p. 307.

CHAPTER 194. NOTE.—Act 130, Feb. 12, 1855, p. 279, provides for a State agricultural school.

Act 142, Feb. 16, 1857, amends section 2 of the above act.

Act 235, Feb. 15, 1859, page 671, makes additional provisions for the school; all these are superseded by this chapter 194; and for repeal, see, § 5012.

§ 4983. (3538.) SEC. 7. The board shall direct the disposition of any moneys appropriated to the State agricultural college.

Secretary and office.

§ 4984. (3539.) SEC. 8. The secretary of the board shall reside at or near the agricultural college, and keep his office at the city of Lansing, in the State buildings, or at the institution, as the board shall direct It shall be his duty to keep a record of the transactions of the State board of agriculture, and of the State agricultural college and farms, which shall be open at all times to the inspection of any citizens of this State. He shall also have the custody of all books, papers, documents and other property which may be deposited in his office, including specimens of the vegetable and animal kingdoms of the State or counties; also keep and file all reports which may be made from time to time by county and State agricultural and horticultural societies, and all correspondence of the office from other persons and societies appertaining to the general business of husbandry; address circulars to societies, and the best practical farmers in the State and elsewhere, with the view of eliciting information upon the newest and best mode of culture of those products, vegetables, trees, etc., adapted to the soil and climate of this State; also, on all subjects connected with field culture, horticulture, stock-raising and the dairy. He shall also encourage the formation of agricultural societies throughout the State, and purchase, receive and distribute such rare and valuable seeds, plants, shrubbery and trees, as it may be in his power to procure from the general government and other sources, as may be adapted to our climate and soils. He shall also encourage the importation of improved breeds of horses, cattle, sheep, hogs and other live stock, and the invention and improvement of labor-saving implements of husbandry, and diffuse information in relation to the same. He shall encourage such domestic industry and household arts as are calculated to promote the general thrift, wealth and resources of the State. To effect these objects he shall correspond with the patent office at Washington, and representatives of our national government abroad, and if possible procure valuable contributions to agriculture from these sources. He shall aid, as far as possible, in obtaining contributions to the museums and the library of the State agricultural college, and thus aid in the promotion of agriculture, science and literature.

Duty to keep record of the board.

To have custody of books, etc.

To file reports of agricultural societies.

Various duties.

Distribution of seeds, plants, etc.

§ 4985. (3540.) SEC. 9. The seeds, plants, trees and shrubbery received by the secretary, and not needed by the college, shall be, so far as possible, distributed equally throughout the State, and placed in the hands of those farmers and others who will agree to cultivate them properly, and return to the secretary's office a reasonable proportion of the products thereof, with a full statement of the mode of cultivation, and such other information as may be necessary to ascertain their value for general cultivation in the State. Information in regard to agriculture may be published by him, from time to time, in the newspapers of the State, provided it does not involve any expense to the State.

SEC. 10. Am. 1861, p. 37; repealed 1873, p. 214, April 25, July 31, Act 157.

SEC. 10, repealed, required annual reports from the Secretary of the board to the governor and legislature. For requirements instead, see § 17.

§ 4986. (3542.) SEC. 11. The secretary shall receive, as a compensation for his services, a salary of one thousand dollars per annum, to be paid quarterly from the State treasury, in the same manner as is provided by law for the payment of the salaries of State officers. Compensation.

§ 4987. (3543.) SEC. 12. The sum of twelve hundred dollars per annum, for the years eighteen hundred and sixty-one and eighteen hundred and sixty-two, or so much thereof as may be esteemed necessary by the State board of agriculture, is also hereby appropriated, to meet the expenses which may be incurred in the purchase and transportation of seeds, postage, and the other contingent expenses of the office of the secretary, and also necessary to pay the expenses of the board in attendance upon their duties. Appropriation.

§ 4988. (3544.) SEC. 13. The State agricultural school, established by act number one hundred thirty, session laws of eighteen hundred and fifty-five, in obedience to section eleven, of article thirteen, of the constitution, shall be known by the name and style of "the State agricultural college;" the design of the institution, in fulfillment of the injunction of the constitution, is to afford thorough instruction in agriculture, and the natural sciences connected therewith; to effect that object most completely, the institution shall combine physical with intellectual education, and shall be a high seminary of learning, in which the graduate of the common school can commence, pursue and finish a course of study, terminating in thorough theoretic and practical instruction in those sciences and arts which bear directly upon agriculture and kindred industrial pursuits. The State agricultural college. Design of the institution.

§ 4989. (3545.) SEC. 14. No student shall be admitted to the institution who is not fifteen years of age, and who does not pass a satisfactory examination in arithmetic, geography, grammar, reading, spelling and penmanship. Requisites for admission.

§ 4990. (3546.) SEC. 15. The course of instruction shall embrace the English language and literature, mathematics, civil engineering, agricultural chemistry, animal and vegetable anatomy and physiology, the veterinary art, entomology, geology, and such other natural sciences as may be prescribed, technology, political, rural and household economy, horticulture, moral philosophy, history, book-keeping, and especially the application of science and the mechanic arts to practical agriculture in the field. Course of instruction.

§ 4991. (3547.) SEC. 16. A full course of study in the institution shall embrace not less than four years. The State board of agriculture may institute winter courses of lectures, for others than students of the institution, under necessary rules and regulations. Full course of study.

§ 4992. (3548.) *Am. 1871, p. 301, April 17, Act 180.* SEC. 17. The academical year shall consist of not less than nine calendar months. This academical year may be divided into such terms, by the State board of agriculture, as, in their judgment, will best secure the objects for which the college was founded; the board may, at any time, temporarily suspend the college in case of fire, the prevalence of fatal diseases, or other unforeseen calamity. Academical year. Temporary suspension of college.

§ 4993. (3549.) SEC. 18. Three hours of each day shall be devoted by every student of the college to labor upon the farm, and Hours of labor.

no person shall be exempt except for physical disability. By a vote of the board of agriculture, at such seasons and in such exigencies as demand it, the hours of labor may be increased to four hours, or diminished to two and one-half hours.

Tuition. § 4994. (3550.) SEC. 19. The State board of agriculture shall be vested with discretion to charge tuition or not, as they may deem most conducive to the interests of the institution, unless acts of the legislature, making appropriations for its support, shall otherwise direct. The board may make discriminations in regard to tuition between students from this State and from other States. One-third of the tuition charged for the academic term shall be paid in advance, and shall be forfeited in case the student abandons the institution.

Powers of board. § 4995. (3551.) SEC. 20. The State board of agriculture shall have the general control and supervision of the State agricultural college, the farm pertaining thereto, and lands which may be vested in the college by State legislation; of all appropriations made by the State, for the support of the same, and also the management of any lands that may hereafter be donated by the general government to this State, in trust for the promotion of agriculture and industrial pursuits The board shall have plenary power to adopt all such ordinances, by-laws and regulations, not in conflict with this act, as they may deem necessary to secure the successful operation of the college, and promote its designated objects.

President and professors of the institution. § 4996. (3552.) SEC. 21. It shall be the duty of the State board of agriculture to choose a president of the State agricultural college before the commencement of the next term of the institution; they shall then proceed to choose such professors, tutors, and employés, as the necessities of the institution demand. In case of vacancy in the office of president, or in case a suitable man cannot be selected, the president of the State board of agriculture, or such member of the board as shall be designated by them, shall be president *pro tem.* of the college, who shall receive such compensation for his services as the board shall determine.

Salaries. § 4997. (3553.) SEC. 22. The board shall fix the salaries of the president, professors and other employés, and prescribe their respective duties. The board may remove the president or subordinate officers, and supply all vacancies.

Board may regulate the course. § 4998. (3554.) SEC. 23. The board shall have power to regulate the course of instruction, and prescribe, with the advice of the faculty, the books to be used in the institution; and also to confer, for similar or equal attainments, similar degrees or testimonials to those conferred by the university of Michigan.

Faculty. § 4999. (3555.) SEC. 24. The president, professors, farm manager and tutors, shall constitute the faculty of the State agricultural college. The president of the college shall be the president of the faculty. The secretary of the State board of agriculture shall be a member and secretary of the faculty.

Faculty to pass rules, etc. § 5000. (3556.) SEC. 25. The faculty shall pass all needful rules and regulations necessary to the government and discipline of the college, regulating the routine of labor, study, meals, and the duties

and exercises, and all such rules and regulations as are necessary to the preservation of morals, decorum and health.

§ 5001. (3557.) SEC. 26. The faculty shall have charge of the laboratories, library, and museums of the institution. To have charge of library, etc.

§ 5002. (3558.) SEC. 27. The faculty shall make an annual report by the first Wednesday of December of each year, to the State board of agriculture, signed by the president and secretary, containing such information and recommendations as the welfare of the institution, in their opinion, demands. Any members of the faculty may make a minority report if they disagree with the conclusions of the majority, which the faculty shall communicate to the board. No communication at any other time, from members of the faculty, shall be entertained by the board, unless they have been submitted to a meeting of the faculty, and sanctioned by a majority. Annual report.

§ 5003. (3559.) SEC. 28. The president shall be the chief executive officer of the State agricultural college, and it shall be his duty to see that the rules and regulations of the State board of agriculture, and the rules and regulations of the faculty be observed and executed. Duty of president.

§ 5004. (3560.) SEC. 29. The subordinate officers and employés, not members of the faculty, shall be under the direction of the president, and in the recess of the board, removable at his discretion, and he may supply vacancies that may be thus or otherwise created; his action in these respects shall be submitted to the approval of the State board of agriculture at their next meeting. Subordinate officers.

§ 5005. (3561.) SEC. 30. The president may or may not perform the duties of a professor, as the State board of agriculture shall determine. If he performs the duties of a professor, or in case the duties of president are exercised by a president *pro tem.*, a superintendent of the farm may be appointed, who shall have the general superintendence of the business pertaining to the farm, the land, and other property of the institution, and who shall be a member of the faculty. Superintendent of farm.

§ 5006. (3562.) SEC. 31. The president and secretary, together with the superintendent of the farm, if there be one, and in case there is not one, then one of the professors to be elected by the faculty, shall constitute a committee to fix the rate of wages allowed to students, and rate of board. In assessing the board, it shall be so estimated that no profit shall be saved to the institution, and as near as possible at the actual cost. The rates of wages allowed, and rate of charge for board, shall, if practicable, be submitted to the State board of agriculture before they take effect. Committee to fix students' wages.

§ 5007. (3563.) SEC. 32. For current expenditures at the State agricultural college, specific sums shall be set aside, in the hands of their treasurer, by the State board of agriculture, which shall be subject to the warrants of the president of the college, countersigned by the secretary. All moneys due to the institution or received in its behalf, shall be collected and received by the secretary, and deposited by him with the treasurer of the State board of agriculture. The secretary shall, with his annual report, render a full and complete account of all moneys received and all warrants Current expenses.

drawn on the treasurer, as secretary of the college, and shall file and preserve all vouchers, receipts, correspondence, or other papers relating thereto.

Annual reports of the several departments to be filed with secretary of the board.

§ 5008. *(3564.) Am. 1871, p. 301, April 17, Act 180; 1873, p. 194, April 24, July 31, Act 145; 1875, p. 267, May 3, Aug. 3, Act 221.* SEC. 33. The superintendents of the farm, horticultural, and other departments, the curators of the museums, and each of the professors, shall make a written and detailed report of the workings of their several departments annually to the president of the college, which said reports shall be kept on file in the office of the secretary of the State board of agriculture. Agricultural operations on the farm shall be carried on experimentally. Careful experiment shall be made annually in field crops, in keeping, feeding, and fattening stock, and in the preparation and application of barn-yard and commercial manures, and a detailed account of them shall be published in the annual report of the board. The college shall serve also as an experimental station. making trial from time to time of new varieties of fruits, grains and vegetables. The reports shall contain an account of the management of all the several fields, pastures, orchards, and gardens of the college, as designated by permanent names or numbers, and shall give an account of the preparation and enriching of the land, the planting, cultivation, harvesting, and yield of the crops and disposition of the same; the management of the stock, with a careful comparison of the cost of keeping, growth, and profit of the several breeds kept on the farm; also an account of the students' labor, specifying the amount used in each of the several departments of the college, with other details, in such a way that the reports, as issued from year to year, shall contain a continuous history of the college, farm, and garden: *Provided*, That the State board of agriculture shall deem the same practicable or advisable.

Agricultural operations to be carried on experimentally.

What reports to contain.

Proviso.

Grant of swamp lands.

§ 5009. (3565.) SEC. 34. All the swamp lands granted to the State of Michigan by act of congress, approved September twenty-eight, one thousand eight hundred and fifty, situate in the townships of Lansing and Meridian, in the county of Ingham, and Dewitt and Bath, in the county of Clinton, of which no sale has been made, or for which no certificates of sale have been issued by the commissioner of the land office, are hereby granted and vested in the State board of agriclture and placed in the possession of the State agricultural college for the exclusive use and benefit of the institution, subject only to the provisions relating to drainage and reclamation of the act of congress donating the same to the State.

Board may sell the lands.

§ 5010. (3566.) SEC. 35. The State board of agriculture shall have authority to sell and dispose of any portions of the swamp lands mentioned in the preceding section of this act, and use the same, or the proceeds thereof, for the purpose of draining, fencing or in any manner improving such other portions of said lands, as it may be deemed advisable to bring under a high state of cultivation for the promotion of the objects of the State agricultural college. The terms and conditions of the sale of the portions of the above described lands thus disposed of, shall be prescribed by the State board of agriculture, and deeds of the same, executed and

Deeds thereof.

acknowledged, in their official capacity, by the president and secretary of the State board of agriculture, shall be good and valid in law.

§ 5011. (3567.) SEC. 36. David Carpenter, of Lenawee county; Justus Gage, of Cass county; Philo Parsons, of Wayne county; Hezekiah G. Wells, of Kalamazoo county; Silas A. Yerkes, of Kent county, and Charles Rich, of Lapeer county, are hereby constituted and appointed the first State board of agriculture. At their first meeting, which the governor of the State is hereby authorized and directed to call at as early a day as practicable, they shall determine by lot their several periods of service, two of whom shall serve for two years, two of whom shall serve for four years, and two of whom shall serve for six years respectively, from the third Wednesday of January last past, when they are superseded by appointments, in accordance with the provisions of section one of this act, or until their successors are chosen. First members of board. Terms.

§ 5012. (3568.) SEC. 37. Act number one hundred and thirty, session laws of eighteen hundred and fifty-five, being an act for the establishment of a State agricultural school, and all other acts or parts of acts in conflict with the provisions of this act, are hereby repealed. Repeal.

MILITARY SCHOOL.

§ 5013. (3569.) *1863, p. 364, Mar. 20, June 22, Act 211.* SECTION 1. *The People of the State of Michigan enact,* That in addition to the course of instruction already provided by law for the agricultural college of this State, there shall be added military tactics and military engineering. Military school established.

§ 5014. (3570). SEC. 2. The State board of agriculture are hereby authorized and required to make such additional rules and regulations for the government and control of the agricultural college as may be necessary to carry into effect the provisions of section one of this act. Rules and regulations.

§ 5015. (3571.) SEC. 3. The State board of agriculture shall, by and with the advice and consent of the governor, the adjutant general and quartermaster general, procure, at the expense of the State, all such arms, accoutrements, books and instruments, and appoint such additional professors and instructors, as, in their discretion, may be necessary to carry into effect the provisions of this act: *Provided,* That nothing in this act shall be construed to authorize the incurring of any indebtedness against the State, or the expenditure of money beyond the appropriations made to the agricultural college. Arms, accoutrements, etc. Proviso.

1883, No. 165, SECTION 1. *The People of the State of Michigan enact,* That the quartermaster general be authorized, with the advice and consent of the military board, to deposit with the State board of agriculture at the agricultural college, arms and accoutrements for the use of said college. Arms, etc., to be deposited at college.

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§ 5013. "An act to establish a military school in connection with the agricultural college:" No. 211, Mar. 20, 1863, p. 364.

LAW REGARDING REPORTS.

Secretary's report.

1883, p. 184, No. 173, SEC. 1. The secretary of the State board of agriculture shall report to the legislature at every regular session thereof, and to the governor on the first Wednesday of January of each year when the legislature is not in session, which report shall embrace all statements, accounts, statistics, prize essays, and other information relative to agriculture in general, proceedings of the State board of agriculture, of the State agricultural college and farm, of the State agricultural society, and of the county and district agricultural societies, to be approved by the board; that eight thousand copies of this report shall be printed and bound annually prior to the first day of June and shall be immediately placed at the dis posal of the State board of agriculture; four thousand copies to be distributed by the secretary of said State board of agriculture as the board shall direct, and the remaining four thousand copies to be distributed prior to the first day of September after publication by the secretary of the board, to the secretary of the State agricultural society, to the secretary of the State grange and to the secretaries of the various district and county societies, as equally as may be according to the population of said counties, to be by said secretaries distributed among the various viewing committees of county and district fairs, giving one volume of said report to each of said committees as shall be present and discharge the duties of the office on the day of the county and district fairs; and in addition to the foregoing there shall be a number of copies of said report equal to the number of reports bound as joint documents, which shall be disposed of in the same manner as the joint documents: also a sufficient number of copies to supply crop correspondents with one copy each, which shall be distributed by the Secretary of State.

Additional copies of report.

SEC. 21 (1877, No. 170, §12). Enacts that there shall be published such a number of copies (additional to those otherwise provided for of the reports of the several officers, boards of officers, and institutions making reports, as they may desire, not exceeding five hundred copies, to be distributed by them in their discretion: *Provided further*, That the board of State auditors may in their discretion order an additional number of copies of any of said reports published, not exceeding three hundred copies, which shall be placed at the disposal of the officers making the reports.

ANNUAL REPORT OF STATE OFFICERS—BOARDS, AND PUBLIC INSTITIONS.

Annual reports.

§ 354. (231.) SEC. 2. It shall be the duty of the several officers and boards of officers of this State, and also of the several public institutions thereof, from whom annual reports are now or may hereafter be required, to make their respective annual reports to the governor, and for the period covered by the fiscal year for the treasury, as established by section one of this act, and to cause their respective reports to be placed in the hands of the printer of the laws of this State, for publication, as soon as practicable after the close of the fiscal year.

§ 355. (232.) SEC. 3. It shall be the duty of each of said officers to examine and correct the proof-sheets and superintend the publication of his report, and each of said boards shall appoint one of its members or some other suitable person, who shall superintend the publication of its report. *Publication of reports.*

STATE INSTITUTIONS AND REGULATIONS RELATING THERETO.

§ 412. *1881, p. 247, June 2, Sept. 10, Act 206.* SECTION 1. *The People of the State of Michigan enact,* That all educational, charitable, reformatory, and penal institutions, supported wholly or in part by the State, shall be known as State institutions. *State institutions.*

§ 413. SEC. 2. The board of each State institution shall, by the first day of November preceding the regular sessions of the legislature, make out and present to the governor a detailed statement of the operations of the institutions for the two fiscal years closing on the thirtieth day of the preceding September, which shall include the report of the superintendent, warden, or other proper chief officer, for the same period, and a report of the treasurer of all receipts and disbursements made during the same period, which report shall be furnished the State printer for publication by the first day of November of the year when made. That such reports shall show at the time of making the same, in detail, the number and names of the various professors, superintendents, officials, and all other regular employés, and the wages or salary paid to each, and what, if any, other emoluments are allowed, and to whom. The boards of each State institution, which is essentially educational in character, shall also annually, before the first day of November, make out and present to the superintendent of public instruction a manuscript report showing: *Report to governor.* *Report to superintendent of public instruction.*

First, The condition of the educational interests of the institution;

Second, The number and names of the various professors, tutors, and instructors;

Third, The number of students or pupils in the several departments, and in the different classes;

Fourth, The courses of study pursued, and the books of instruction used;

Fifth, Such other information and suggestions as said board may deem important, or the superintendent of public instruction may request, to embody in his annual report.

§ 414. SEC. 3. That the board of each State institution shall cause a full and accurate inventory, in duplicate, to be taken at the close of its fiscal year next preceding the regular biennial session of the legislature, by the officer in charge, which shall specify the number of acres of land and the value thereof, the number, kind, and value of buildings, the various kinds of personal property and the value thereof, which inventory shall be signed by the officer making the same, and certified as correct by the board for which it is made, one copy of which shall be made in a proper record book to be kept for that purpose in the institution, and the other shall be filed in the office of the secretary of state by the first day of *Inventory, how made.*

November of the year when made. Any board of any State institution may in its discretion cause such property to be appraised on oath, by two disinterested and competent appraisers, to be appointed for that purpose by the board, and a summary of each inventory made shall be published in the biennial report.

Record of receipts and expenditures, how kept.

§ 415. Sec. 4. Every educational, charitable, penal, and reformatory institution, shall, in proper books for that purpose, keep a regular account of all moneys received and disbursed, and the receipts from and expenditures for and on account of each department of business, or for the construction of buildings, or the improvement of the premises; and in those institutions where farming and gardening operations are carried on, the accounts shall be so kept as to show, as near as practicable, the cost of carrying on the farm or garden and the quantity and value of the productions of the same, with the cost of live stock raised or fattened for the use of the institution, and the quantity and value thereof, and where manufacturing operations are carried on, the cost and result of each separate branch of manufacture, and the quality and value of all manufactured articles sold or used in the institution, so as to clearly exhibit the receipts and expenditures in each department of business carried on in the institution, and the cost of educating and maintaining each student or inmate therein. That the accounts of receipts and disbursements in all State institutions shall conform as near as may be practicable to a uniform system, and to accomplish this result the auditor general is authorized to prescribe such a system of accounts as he shall deem proper for said institutions, which shall secure as near as may be such uniformity.

Accounts to be audited by board of auditors.

§ 416. Sec. 5. The accounts of members of boards of State institutions for official expenses and services, or either, where allowed by law, shall first be certified to be correct by the board to which the member belongs, and then shall be audited by the board of state auditors and paid from the general fund.

Board to recommend appropriations.

§ 417. Sec. 6. The boards of State institutions shall, in their biennial reports, recommend what amounts in its opinion are needed for the next two years for ordinary current expenses and for special purposes by the institution so reporting, with the reasons for such recommendations.

SUNDRY LAWS.

SUGAR BOUNTY.

Reports of sugar industry.

§ 2330 (1881, No. 268, Sec. 3). The State board of agriculture shall direct their secretary to receive reports of results, and said secretary shall collect such reports and the process by which such results are obtained in the culture of sugar cane, corn stalks, and beets, and the manufacture of sugar from the same, and report the same in full to the board and said board shall incorporate the same in their annual report.

Bounty, how paid.

§ 2331. Sec. 4. There shall be paid from the treasury of the State as bounty, to any individual, company, or corporation, upon the report and determination of the board of agriculture, as provided for in section three, the sum of two dollars for every hundred

pounds of merchantable sucrose sugar manufactured by said individual, company, or corporation in this State, from sugar cane, corn stalks, or beets grown therein, and said bounty shall be paid upon each year's results for the term of five years from the first day of January, eighteen hundred and eighty-two, to all individuals, corporations, or companies entitled to the same under this act: *Provided*, That the person receiving such bounty shall make a report to the State board of agriculture, duly verified, of all the parts of the process employed in the manufacture of such sugar, together with a definite statement of the yield: *And provided further*, That it shall contain at least eighty per cent. crystallized sugar, as determined by the polariscope, under the direction of the State board of agriculture.

PUBLIC DOCUMENTS.

§ 11, § 12, § 15, § 16, § 19, and § 20 (1877, No. 170, Sections 2, 3, 6, 7, 10, and 11) provide that there shall be published of the "Public Acts," "Local Acts," "Journal of the Senate," "Journal of the House," "Joint Documents," report of the secretary of state on births, marriages, and deaths, and report of the secretary of the State board of health, a sufficient number of copies to supply with one copy each, State officers, their deputies, and libraries, offices and libraries of State institutions, members and libraries of State boards, etc., etc. Public documents.

§ 36 (1875, No. 25, Sec. 1) enacts that the State librarian, upon receipt of the statutes of the United States, shall send one copy to the library of the agricultural college. U. S. statutes.

§ 7214 (1881, No. 116, Sec. 11) enacts that the college library shall be given one copy of each issue of the State supreme court reports. Court reports.

Section 5471 provides for duplicate collections made from the geological survey of the State being given to the college museum. Geological collections.

MEMBERS OF BOARDS PROHIBITED FROM BEING INTERESTED IN CONTRACTS.

§ 9355. *1873, p. 141, Apr. 17, Act 107.* Section 1. *The People of the State of Michigan enact*, That no trustee, inspector, regent, superintendent, agent, officer, or member of any board having control or charge of any educational, charitable, penal, pauper, or reformatory public institutions of this State, or of any county thereof, shall be personally directly, or indirectly interested in any contract, purchase, or sale made for, or on account, or in behalf of any such institution, and all such contracts, purchases, or sales shall be held null and void; nor shall any such officer corruptly accept any bribe from any persons interested in such contract; and it is hereby made the duty of the governor or other appointing power, upon proof satisfactory of a violation of the provisions of this section, to immediately remove the officer or employé offending as aforesaid; and upon conviction thereof before a court of competent jurisdiction, the offender shall be punished by a fine not exceeding five hundred dollars. Officers of public institutions not to be interested in certain contracts. Removal for violation of this section. Fine.

INSPECTION OF COMMERCIAL FERTILIZERS.

Sale of fertilizer at certain price.

Pub. Acts, 1885, No. 26, p. 20. SECTION 1. *The People of the State of Michigan enact,* That any person or persons who shall sell or offer for sale in this State any commercial fertilizer, the retail price of which exceeds ten dollars per ton, shall affix on the outside of every package containing such fertilizer a plainly printed certificate, stating the number of net pounds therein; the name or trade mark under which such article is sold; the name of the manufacturer; the place of manufacture, and a chemical analysis, stating the percentage of nitrogen in an available form; of potash soluble in water, and of phosphoric acid in an available form (soluble or reverted) and the insoluble phosphoric acid.

Packages, how labeled.

File analysis, etc., with secretary board of agriculture.

SEC. 2. Before any commercial fertilizer is sold or offered for sale, the manufacturer, importer or party who causes it to be sold or offered for sale within this State, shall file with the secretary of the State board of agriculture a certified copy of the analysis and certificate referred to in section one, and shall also deposit with said secretary a sealed glass jar containing not less than two pounds of such fertilizer, with an affidavit that it is a fair sample of the article thus to be sold or offered for sale.

Sample.

License fee.

SEC. 3. The manufacturer, importer, or agent of any commercial fertilizer, the retail price of which exceeds ten dollars per ton as aforesaid, shall pay annually to the secretary of the State board of agriculture, on or before the first day of May, a license fee of twenty dollars for each and every brand of fertilizer he offers for sale in this State: *Provided,* That whenever the manufacturer or importer shall have paid this license fee his agents shall not be required to do so.

Proviso.

Analyses, by whom made and when.

SEC. 4. All such analyses of commercial fertilizers required by this act shall be made under the direction of the State board of agriculture and paid for out of the funds arising from the license fees provided for in section three. At least one analysis of each fertilizer shall be made annually.

Statement of, in annual report board of agriculture.

SEC. 5. The secretary of the State board of agriculture shall publish in his annual report a correct statement of all analyses made and certificates filed in his office, together with a statement of all moneys received for license fees, and expended for analysis. Any surplus from license fees remaining on hand at the close of the fiscal year shall be placed to the credit of the experimental fund of said board.

Surplus fees.

Penalty for non-compliance.

SEC. 6. Any person or persons who shall sell or offer for sale any commercial fertilizer in this State without first complying with the provisions of sections one, two, and three of this act, or who shall attach or cause to be attached to any such package of fertilizer an analysis stating that it contains a larger percentage of any one or more of the constituents or ingredients named in section one of this act than it really does contain, shall upon conviction thereof be fined not less than one hundred dollars for the first offense, and not less than three hundred dollars for every subsequent offense, and the offender shall also be liable for all damages sustained by the purchaser of such fertilizer on account of such misrepresentation.

SEC. 7. The State board of agriculture by any duly authorized agent is hereby authorized to select from any package of commercial fertilizer exposed for sale in this State, a quantity, not exceeding two pounds, for a sample, such sample to be used for the purposes of an official analysis and for comparison with the certificate filed with the secretary of the State board of agriculture and with the certificate affixed to the package on sale. Power of board of agriculture.

SEC. 8. All suits for the recovery of fines under the provisions of this act shall be brought under the direction of the State board of agriculture. Suits, how brought.

Approved March 20, 1885.

AGRICULTURAL COLLEGE BULLETINS.

Pub. Acts, 1885, No. 81, p. 78. SECTION 1. *The People of the State of Michigan enact,* That the State board of agriculture be and they are hereby authorized to provide from time to time in bulletin form, for the dissemination among the people of this State, and through the medium of the public press the results of experiments made in any of the different departments of the agricultural college, and such other information that they may deem of sufficient importance to require it to come to the immediate knowledge of the farmers and horticulturists of the State. State board of agriculture authorized, etc.

SEC. 2. The several professors of chemistry, zoölogy, botany, agriculture, horticulture, and veterinary science, shall each, at least twice in each year, not excluding the president and other professors, prepare for publication an article embracing such facts as they may deem of public importance, a copy of which shall be similtaneously sent to each and every newspaper published in the State, and to such persons as the State board of agriculture may think proper; said professors to so arrange that at least one of said articles shall be sent out, as above provided, the first week of each and every month, in each and every year. Who to prepare articles, what to contain, etc.

SEC. 3. The board of State auditors shall, upon the approval of the State board of agriculture, audit the accounts for printing, stationery, and postage incurred in the publishing and disseminating of said bulletins and the same shall be paid out of the general fund: *Provided,* That no account for printing the same in any newspaper shall be allowed. Auditing of accounts for printing, etc. Proviso.

This act is ordered to take immediate effect.

Approved May 11, 1885.

AGRICULTURAL COLLEGE LANDS.

§ 5254. *1875, p. 132, Apr. 22, Act 95.* SECTION 1. *The People of the State of Michigan enact,* That the commissioner of the State land office in his discretion be, and he is hereby authorized and empowered, to cause the lands hereinafter designated in this act to be examined, and their value and condition ascertained. Commissioner of State land office authorized to examine certain lands, etc.

§ 5255. *Am. 1879, p. 45, Apr. 29, Act 51.* SEC. 2 The lands which may be examined under this act are any of the lands owned, or held in trust, or otherwise by this State. Lands to be examined.

Appointment of agents.

§ 5256. SEC. 3. Said commissioner is hereby authorized to appoint and designate the supervisors of each of the organized townships within which any of the lands to be examined may be located, as examining agents, whose duties in the premises shall be fully defined in a letter of instructions, which it will be the duty of said commissioner to furnish to each person who shall be appointed under this act: *Provided*, That if said commissioner shall deem it for the best interests of the State, he may, by and with the advice and consent of the governor, appoint one or more persons as such examining agents, to act in the place of any supervisors, to make examinations in unsettled and unimproved localities.

Proviso.

To furnish plats, descriptions, etc., to agents.

§ 5257. SEC. 4. It shall be the duty of the commissioner of the State land office to furnish each of said agents with plats and descriptions of all of the lands that it will be the duty of such agents to examine, together with all such other information and instruction relating to said lands, or to their duties as such agents, as may be sufficient to enable said agents, after careful personal examination of said lands, to report fully as to their character, value, and condition, at the time of the examination; and in case any of said lands have been trespassed upon and their value deteriorated thereby, said agent shall carefully estimate and report the amount and character of timber probably cut and removed, the date of the cutting, and by whom.

Reports of agents when lands have been trespassed upon.

Board of control to carry out provisions of this act, and its powers and duties.

§ 5258. SEC. 5. The governor, the State treasurer, and the commissioner of the State land office, be and are hereby empowered and constituted a board of control, to carry out the provisions of this act, to examine and act upon the reports made by the said agent or agents: and if in the opinion of the board the best interest of the State would be promoted by changing the price, or terms, of these lands, the said board may alter, by reducing or advancing the price per acre, or conditions of payment: *Provided*, That not less than twenty-five per cent. of the purchase money is paid at the time of purchase. And when the price and terms are so fixed, the said board shall fix the time when the change, if any, is made, will take effect, and cause the same to be published.

Proviso.

Compensation of agents.

§ 5259. *Am., Ib., 1879, p. 45.* SEC. 6. Said agents shall receive as compensation for their services such sum or sums as the board of State auditors shall determine and allow, including necessary expenses, which bills for services and expenses shall be itemized and sworn to and made upon forms furnished by the commissioner of the land office, the same to be paid out of the general fund, and apportioned to the several funds, according to the expenses attending the examination of lands belonging to the different classes herein mentioned, and the commisssioner of the State land office may, in his discretion, require said agents to give a good and sufficient bond for the faithful discharge of their duties, and file the constitutional oath of office; and any agent appointed under this act who shall give to any person any information in regard to the value of lands examined, or timber thereon before reporting the same to the commissioner of the State land office, shall be deemed guilty of a misdemeanor.

Commissioner may require bonds.

Penalty for giving information before reporting.

GRANT ACCEPTED.

Grant accepted.

§ 5367. (3926.) *1863, p. 54, Feb. 25, Act 46.* SECTION 1. *The People of the State of Michigan enact,* That the grant of land accruing to the State of Michigan, under and by virtue of an act of congress, donating public lands to the several states and territories, which may provide colleges for the benefit of agriculture and the mechanic arts, approved July second, eighteen hundred and sixty-two, be and the same is hereby accepted, in accordance with all the conditions and provisions in said act contained.

SELECTION, CARE, AND DISPOSITION OF AGRICULTURAL COLLEGE LANDS.

Agricultural land grant board.

§ 5368. (3927.) *1863, p. 201, Mar. 18, Act 140.* SECTION 1. *The People of the State of Michigan enact,* That the governor, the auditor general, secretary of State, State treasurer, attorney general, and commissioner of the State land office, shall constitute a board, to be known as the agricultural land grant board, and said board shall have the control and management of the selection, the care and disposal of the lands granted to this State by act of congress, approved July second, eighteen hundred and sixty-two, providing for the endowment of colleges for the benefit of agriculture and the mechanic arts. Said board shall appoint one or more suitable commissioners, whose duty it shall be to select and locate, as soon as practicable, the quantity of land donated to this State by the act of congress aforesaid, and to make return of the lands so located to the commissioner of the State land office of Michigan, properly designated and described, and to notify the registers of the United States district land offices, for the districts in which the selection and location is made, of such selection as fast as the land is so selected.

Powers of.

Commissioners; duties of.

Description of lands selected to be forwarded to secretary of the interior.

§ 5369. (3928.) SEC. 2. The commissioner of the State land office shall, as fast as such selections are made and returned to him, forward to the secretary of the interior of the United States, full and complete descriptions of all such lands, and obtain the necessary title to the State of Michigan for the same.

Price per acre; one-fourth down, interest on balance.

§ 5370. (3929.) *Am. 1869, p. 51, Mar. 16, Act. 3.* SEC. 3. All of said lands, excepting as hereinafter provided, shall be sold for not less than three dollars per acre, one-fourth of the purchase price to be paid at the time of purchase, and the balance at any time thereafter, at the option of the purchaser, with interest on the unpaid balance at the rate of seven per cent. per annum, payable annually into the State treasury, in accordance with, and subject to all the terms and conditions of payment, and forfeitures for non-payment of all interest and taxes due thereon, as is now provided by the laws regulating the sale and forfeiture of primary school lands: *Provided, however,* That all of said lands which are valuable *principally* for the timber thereon, shall be sold for not less than five dollars per acre, the whole of the purchase money therefor to be paid at the date of purchase.

Proviso.

§ 5371. (3930.) SEC. 4. The proceeds of the sale of said land

Proceeds of sale, how applied.

shall be applied and used according to the conditions of the act of *congress granting the same to the State.*

Commissioner of State land office authorized to sell the lands.

§ 5372. (3931.) SEC. 5. Whenever said lands, or any part of them, shall have been selected, certified to the commissioner of the State land office, withdrawn from market, and so marked on the plats, and certified by the register of any United States land office for the proper district, by authority of the commissioner of the general land office of the United States, the commissioner of the State land office may, by direction of said land grant board, sell said lands in quantities of not less than any legal subdivision, according to the original United States survey; and on such sale being made, the commissioner of the State land office shall issue his certificate of sale in the usual form, setting forth the quantity and description of the land sold, the price per acre, the amount paid at the time of purchase, the balance due, with the annual rate of interest, and the time the interest is payable, as is required by law for the payment of interest on contracts for the purchase of primary school lands, and that the purchaser will be entitled to a patent from this State on payment in full of the principal and interest, together with all taxes assessed on such land.

Commissioner to issue certificates.

Effect of certificate.

§ 5373. (3932.) SEC. 6. Certificates of purchase issued pursuant to the provisions of law, shall entitle the purchaser to the possession of the lands therein described, and shall be sufficient evidence of title to enable the purchaser, his heirs, or assigns, to maintain actions of trespass for injuries done to the same, or ejectment, or any other proper action or proceeding to recover possession thereof, unless such certificate shall have become void by forfeiture; and all certificates of purchase in force may be recorded in the same manner that deeds of conveyance are authorized to be recorded.

Patents.

§ 5374. (3933.) SEC. 7. The governor of this State shall sign and cause to be issued, patents for said lands, as soon as practicable after payment is made in full of principal, interest, and all taxes, as aforesaid.

How money received from sale of lands to be disposed of.

§ 5375. (3934.) *Am. 1871, p. 87, Mar. 31, Act 68; 1875, p. 55, Mar. 26, Act 60.* SEC. 8. The money received from the sale of said land shall be paid into the State treasury, and shall be placed in the general fund, but the amount thereof shall be placed to the credit of the agricultural college fund upon the books of the auditor general, and the annual interest thereon computed at seven per cent., shall be regularly applied under the direction of the State board of agriculture to the support and maintenance of the State agricultural college, where the leading object shall be—without excluding other scientific and classical studies, and including military tactics—to teach such branches of learning as are related to agriculture and mechanic arts, in order to promote the liberal and practical education of industrial classes in the several pursuits and professions of life.

How interest shall be disposed of.

Leading object of college.

Proceedings in case there is not an amount of land in the State equal to the grant.

§ 5376. (3935.) SEC. 9. The said land grant board shall, on finding that there is not in this State a sufficient amount of land belonging to the United States, subject to private entry, to make up the full amount of the land granted by said act of congress, notify the commissioner of the United States land office of the fact,

and obtain, as soon as practicable, from the proper authority, permission to select an amount sufficient to make up such deficiency from United States lands in other states or territories of the United States, and shall send one or more commissioners into such states or territories to select the same, under such rules and regulations as said board may prescribe.

§ 5377. (3936.) SEC. 10. The agricultural land grant board shall certify, from time to time, to the auditor general the amounts required to pay expenses of selecting and locating, and making returns of said lands, and the auditor general shall draw his warrant upon the State treasurer for the amounts thus certified, and the State treasurer shall pay the same out of the general fund. Said land grant board may make such rules and regulations, in relation to the time and manner of selecting and locating the lands, making the returns, and keeping the accounts of expenses, as they may deem necessary and proper. All contracts and certificates of said board shall be signed by the chairman, and countersigned by the secretary of the agricultural land grant board.

Expenses of locating, how paid.

Board may make rules and regulations.

§ 5378. (3937.) SEC. 11. In the sale of lands, the principal value of which consists in the timber, the commissioner of the State land office shall require the payment of the entire amount of purchase money at the time of purchase, or such portion of the same above one-fourth, as he may deem for the best interest of the State.

Commissioners may require full payment for lands.

LOCATION AND SALE OF AGRICULTURAL COLLEGE LANDS.

§ 5379. (3992.) *1867, p. 326, Mar. 20, J. R. No. 28.* WHEREAS, The legislature of this State, by an act approved March eighteenth, eighteen hundred and sixty-three, conferred upon the agricultural land grant board, consisting of the governor, the auditor general, secretary of State, State treasurer, attorney general, and commissioner of the State land office, the entire control and management of the selection, the care, and disposal of the lands granted to this State by act of congress, approved July second, eighteen hundred and sixty-two;

Preamble.

AND WHEREAS, It is for the interest of the State agricultural college, of the tax-payers of this State, and of the inhabitants residing in the vicinity of said lands, that these lands be sold at an early day, and the proceeds be applied to the endowment of the State agricultural college;

AND WHEREAS, It is understood that the secretary of the interior of the United States will not issue patents for these lands until the amount is located; therefore,

Resolved by the Senate and House of Representatives of the State of Michigan, That the agricultural land grant board be and the same hereby are instructed and directed to complete the location of these lands, and take the necessary steps to obtain patents therefor from the secretary of the interior of the United States, and at the earliest day practicable place the said lands in market, and sell the same according to the provisions of an act entitled "An act to provide for the selection, care, and disposition of the lands donated to the State of Michigan, by act of congress, approved July second,

Board instructed to locate lands.

eighteen hundred and sixty-two, for the endowment of colleges for the benefit of agriculture and the mechanic arts," and approved March eighteenth, eighteen hundred and sixty-three.

ADJUSTMENT OF IRREGULARITIES IN THE SALE OF AGRICULTURAL COLLEGE LANDS.

Preamble. § 5380. *1879, p. 313, May 28, J. R. No. 28.* WHEREAS, By an act of the legislature, approved February twenty-fifth, in the year of our Lord one thousand eight hundred and sixty-three, the State of Michigan accepted a donation of public lands from the United States, to be used for the endowment of colleges for the benefit of agriculture and the mechanic arts;

AND WHEREAS, By a further act of the legislature, approved March eighteenth, in the year of our Lord one thousand eight hundred and sixty-three, the governor, auditor general, secretary of State, State treasurer, attorney general, and commissioner of the State land office, were constituted and designated as the agricultural land grant board, with full power and authority to control and dispose of said lands;

AND WHEREAS Said act further provided, that by direction of said land grant board, the commissioner of the State land office might sell said lands in the manner therein provided;

AND WHEREAS, The commissioner of the State land office has sold large quantities of said lands without having obtained the formal or official direction of said land grant board to make such sales;

AND WHEREAS, It is alleged that all such sales are irregular;

AND WHEREAS, The lands thus sold are principally held or occupied by innocent parties, many of whom having made valuable improvements [improvement] thereon, whose rights and interests in the premises demand the protection of the State; therefore, be it

Board instructed to investigate. *Resolved by the Senate and House of Representatives of the State of Michigan,* That the agricultural land grant board be, and they are hereby authorized and instructed to examine into the matter of said alleged irregular sales of agricultural college lands, and to adjust and determine the same, and to confirm all such sales of said lands as shall appear to said board, to have been made in accordance with the terms and conditions of section number three (3) of said act, the same being section three thousand nine hundred and twenty-nine of the Compiled Laws of eighteen hundred and seventy-one;

Power of board. *And resolved further,* That if the said board shall find that any of such sales of said lands shall have been made at a less price per acre than provided for in the section last referred to, then it is hereby made the duty of said board to elect whether they will receive from the purchaser or purchasers, or other party or parties holding under them, the full purchase price contemplated by the said section, and confirm such sales, or take such further measures as they shall deem proper for the protection of the interests of the State: *Provided, however,* That if any such sales are canceled, either by the action of said board or by the decree of any court of competent jurisdiction, then the amount of money to be refunded

shall in no case exceed the amount received by the State, as principal, interest, and taxes on the lands described in the particular sale so canceled: *Provided further*, That all settlers on lands so canceled, shall also have a valid claim against the State for all actual improvements;

Resolved, That this joint resolution shall be in full force and effect from and after its passage.

SWAMP LANDS.

§ 5406 (1858, No. 31 Sec. 16). All of the swamp lands granted to Michigan by act of Congress, approved September 28, 1850, and situate in the township of Lansing and Meridian, in the county of Ingham, and in the townships of Dewitt and Bath, county of Clinton, except such as have been occupied by persons entitled to pre-emption under this act at least thirty days next previous to the passage of this act, shall be reserved from sale by said commissioner, and possession of the same shall be immediately delivered over to the agricultural college for its use, and for the purposes of drainage and reclamation, in accordance with the provisions of the act of Congress donating the same to the State.

LAWS OF CONGRESS.

By an act approved July 2d, 1862, Congress granted to the several States an amount of public land equal to 30,000 acres for each Senator and Representative, to which the States were respectively entitled by the apportionment under the census of 1860, for the endowment, support, and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life.

Under *this grant, owing to certain regulations regarding estimation of fractional* sections, Michigan received 235,673.37 acres.

The conditions of this grant are as follows:

SEC 5. *And be it further enacted*, That the grant of land and land scrip hereby authorized shall be made on the following conditions, to which as well as to the provisions hereinbefore contained, the previous assent of the several States shall be signified by legislative acts:

First. If any portion of the fund invested, as provided by the foregoing section, or any portion of the interest thereon, shall, by any action or contingency, be diminished or lost, it shall be replaced by the State to which it belongs, so that the capital of the fund shall remain forever undiminished; and the annual interest shall be regularly applied without diminution to the purposes mentioned in the fourth section of this act, except that a sum, not exceeding ten per centum upon the amount received by any State under the provisions of this act, may be expended for the purchase of lands for sites or experimental farms whenever authorized by the respective legislatures of said States;

Second. No portion of said fund, nor the interest thereon, shall be applied, directly or indirectly, under any pretense whatever, to the purchase, erection, preservation or repair, of any building or buildings;

Third. Any State which may take and claim the benefit of the provisions of this act shall provide, within five years, at least not less than one college, as prescribed in the fourth section of this act, or the grant to such State shall cease; and said State shall be bound to pay the United States the amount received of any lands previously sold, and that the title to purchasers under the State shall be valid;

Fourth. An annual report shall be made regarding the progress of each college, recording any improvements and experiments made, with their cost and results, and such other matters, including State industrial and economical statistics, as may be supposed useful; one copy of which shall be transmitted by mail free, by each, to all the other colleges which may be endowed under the provisions of this act, and also one copy to the Secretary of the Interior;

Fifth. When lands shall be selected from those which have been raised to double the minimum price in consequence of railroad grants, they shall be computed to the States at the maximum price, and the number of acres proportionally diminished;

Sixth, No State, while in a condition of rebellion or insurrection against the government of the United States, shall be entitled to the benefit of this act;

Seventh. No State shall be entitled to the benefits of this act, unless it shall express its acceptance thereof by its legislature within two years from the date of its approval by the President.

SEC. 6. *And be it further enacted*, That land scrip issued under the provisions of this act shall not be subject to location until after the first day of January, 1863.

SEC. 7. *And be it further enacted*, That land officers shall receive the same fees for locating land scrip issued under the provisions of this act as is now allowed for the location of military bounty land warrants under existing laws: *Provided*, That maximum compensation shall not be thereby increased.

SEC. 8. *And be it further enacted*, That the governors of the several States to which scrip shall be issued under this act shall be required to report annually to Congress all sales made of such scrip until the whole shall be disposed of, the amount received for the same, and what appropriation has been made of the proceeds.

Approved July, 1861.

NOTE.—The time for accepting the provisions of this act was subsequently extended and provisions made for new States.

MILITARY OFFICERS.

Thirty-Ninth Congress, Session I, Chapter 299.

SEC. 26. *And be it further enacted*, That for the purpose of promoting knowledge of military science among the young men of the United States, the President may, upon the application of an established college or university, within the United States, with sufficient capacity to educate at one time not less than one hundred and fifty male students, detail an officer of the army to act as president, superintendent, or professor of such college or university; that the number of officers so detailed shall not exceed * thirty at any time, and shall be apportioned through the United States as nearly as practicable

* As amended Act approved July 5, 1876.

according to population, and shall be governed by general rules, to be prescribed from time to time by the President.

Approved July 28, 1866.

Forty-Sixth Congress, Session I, Chapter 81.

Ordnance Department.—That upon the application of any college, university, or institution of learning incorporated under the laws of any State within the United States, having capacity at the same time to educate not less than one hundred and fifty male students, the President may detail an officer of the army in the retired list, to act as president, superintendent, or professor thereof, and such officer may receive from the institution to which he may be detailed the difference between his retired and full pay, and shall not receive any additional pay or allowance from the United States.

Approved May 4, 1880.

DEPARTMENT REPORTS.

REPORT OF PRESIDENT WILLITS.

To the State Board of Agriculture:

GENTLEMEN:—I nominally assumed the duties of my position, July 1st, 1885; hence have but three months of the year to cover by my report. Having accepted the position with the understanding that I should remain at the State Normal School, as its principal, till the close of its school year, I closed up my duties then and reported at the college on the day agreed, my family having preceded me some two weeks. In the meantime I had been appointed by the State Board of Agriculture in conjunction with Mr. Chamberlain of the Board, a delegate to a convention of Agricultural College and Experiment Stations, to be held at the Department of Agriculture in Washington, D. C., July 8th, 1885, and for which due preparations had to be made. I was invited by the Commissioner of Agr culture, to read a paper on "Industrial Education," at that Convention. As I had been fully engaged with my duties at the Normal School, I had to take the intervening time to prepare the paper; hence until my return from the convention, I was not able fully to assume my duties.

Your delegates were promptly on hand at the convention and attended all its sessions. Thirty-one States and Territories were represented, and the discussions were of great interest and of mutual benefit. Aside from the general and individual benefits to the delegates themselves, the prime object of the convention received a substantial impulse. This object may be succinctly stated, as an effort to bring all the Agricultural Colleges and experiment stations into harmonious co-operation through the Department of Agriculture, so as to assign and develop more systematically the experiments devised, and to secure a consolidated report of the results. It was found that in nearly all cases the colleges and stations were crippled for means, properly to conduct and report the experiments; that the colleges following the manifest intent of the act of 1862 conferring the land grant upon the States, had devoted the funds in a large degree to instruction, rather than to experiments, and that while all had sought so far as in them lay to pursue a line of scientific investigations and experiment, it had necessarily been sporadic, subject to the prime object of the colleges under the act, and the results of the experiments meagre and unsatisfactory. The great bulk of the funds was exhausted by the pay roll for instructors, and the leavings only were applied to experiments. It was apparent that since the act of 1862, there had grown up in all the States a vigorous demand, that the college work proper should be supplemented with a greater development of experiment, and that in order that this should be successfully accomplished, the United States should supplement the act of 1862, by substan-

tial aid in that direction. It was contended, and was the sense of the convention, that this aid would be more satisfactory in its results, coming from the general government, than from the States, as likely to be more permanent, and less liable to the vicissitudes of legislatures of the States, who would be more impatient for results. Experiments in agriculture require more time, and to be repeated for a longer series of years than in any other science, to be effectual for good; and should be conducted by students who should become specially fitted for the work. This could be secured only by *permanence* and *continuity*. Hence the convention resolved to present the matter to the next Congress, formulated a bill and appointed a special committee consisting of Pres. Atherton of Pennsylvania College, Pres. Lee of Mississippi Agricultural College, and the writer, to visit Washington for that purpose, the December or January following.

I returned from the convention July 13th, and assumed the active duties of the college. The report of the secretary relating to the exercises of commencement week is so full that I need not repeat it here. I wish, however, to emphasize one feature of commencement week—the alumni meeting. It was a large and representative gathering. I was surprised at the hearty loyalty to the college, the eager interest in its prosperity, and the supreme pleasure their visit afforded them. I have visited many meetings of the alumni of other institutions, but never have I witnessed so lively an interest. It struck me as something peculiar to this college, and upon this fact I base in a large measure the future permanent prosperity of the institution.

The vacation after commencement, was extended from one week, to two, to give most of the faculty an opportunity to attend the annual meeting of the American association for the advancement of science, which this year was held at Ann Arbor. This institution being specially devoted to the sciences and their applications, it was fitting that our Board of Instructors who were members of the association should not be debarred from attending its sessions. The term will be extended one week at its close, so that the full term will be engaged in college work. I remained on the grounds all the time, so as to receive the new students.

The college was opened September 2d. The indications are of a very full attendance such as shall test to the fullest extent our accommodations. Up to this date there have been matriculated 97 new students, and more coming daily. From the experience of the last few years, I have been informed that the spring term will bring a large influx of new students, who are able to pass the fall studies; so that if that experience is verified this year, we shall have for the year at least 150 new students. If so, we shall be obliged to put three students in a room, a matter conducive neither to health nor satisfactory study, as the rooms are not large. We can accommodate with reasonable comfort in the halls and on the grounds 230 to 250 students, and no more, according to the number who can find private quarters.

This brings us face to face with a more serious question. We have a plant here that has cost nearly or quite $400,000, and it justifies and demands at least 500 students. At the last commencement, in an address from the platform, the Governor of the State said the institution fell short of its duty if it had less than 500 students; and any person who has taken the time to investigate our unexcelled facilities for instruction, will feel warranted in coming to the same conclusion. But it is manifest that without additional accommodations we cannot meet their just demands. We are three miles away from Lan-

sing and too far to secure quarters for the surplus attendance, unless some easy and cheap means of transportation is provided. The college is in a sparsely settled region—very few farmers' residences within walking distance, and absolutely no buildings or boarding houses or quarters for students in the vicinity of the grounds. If the students can be got what shall we do with them?

On the first point I have no serious apprehension. I have canvassed the subject fully ever since I began to consider, nearly a year ago, whether I should accept the position tendered to me. I frankly stated to you that numbers were a consideration with me; that in popular estimation the college was obnoxious to the charge that there were too few students for the plant and the expenditure of the money; and that unless I became satisfied that inside of five years 500 students could be placed in the institution I should be compelled to decline your offer. Hence I investigated the subject thoroughly, tested the temper of our people, and the feeling of our public men, and I became fully convinced that there is a constituency, that will in less time than five years supply the required numbers without in any sensible degree impairing the attendance upon our other institutions of learning. The industrial feature with its comprehensive apparatus of the sciences from agriculture down, commends itself to popular regard in these times of over-crowded, so-called professional life.

There are two ways suggested for the extra 250 students, one to build a street railway to Lansing, and the other to build more dormitories. The first without any doubt would be the cheaper in the end, as a company might be induced to build and operate one for a consideration, sayin the guarantee of a certain amount of patronage for three years, till the number of students and the general public would themselves furnish sufficient patronage to pay dividends. On the other hand the dormitories would enable the administration to preserve the industrial *morale* which has characterized the institution since its organization. I cannot see how it can be maintained in its vigor, with a portion of the students who come two, three or more miles—they at least would need to be exempted from manual labor.

But these questions may safely be left to the State Board of Agriculture and the Legislature, as it is not probable that the desirable end to be attained will fail for want of means for the sufficent accommodations for the students who shall knock at our door.

It may be proper to note the fact that the Agricultural College does not exist for students alone. While it is desirable that it should have all the students for whom it has ample facilities for instruction;—the fact that it has not had this full attendance, should not make us oblivious of the fact that the college occupies a field of great public utility aside from its instruction of students. If the general public were aware of the correspondence of some of the Professors, notably those of Agriculture, Chemistry, Botany, Entomology, Horticulture, and Veterinary, always constant, and sometimes almost overwhelming, with citizens of the State making inquiries about seeds, and soils, and fertilizers, and grain, and fruits, and insects, and diseases of animals and the thousand and one matters that fill the fertile brain of our active inquiring people, many questions requiring great research and assiduous labor and observation in the field and the laboratory, much of the criticism heretofore indulged in would fall to the ground. I am happy to state that the Professors one and all are prompt in their response, working early and late, year in and year out, and are fully alive in their respective spheres to the importance of bringing whatever of practical information they may have to the general and individual public. There is not a drone in the faculty. It is impossible to estimate the benefac-

tion such an institution in the far reaching development of its powers and information may be to the State. Year by year it is becoming better and better equipped for this work.

There was some aprehension among our agricultural friends that the adding of the mechanical department would in some way impair the agricultural department; that the students would prefer the former and thereby deplete the matriculations in the latter. All such fears are groundless, for the reason that so long as the agricultural industry shall continue in the lead of all others in the State of Michigan, the proportion o students for that course will always be in excess. Under the policy I suggested to the Board, and to which I shall strictly adhere, to wit: the classifying of no student into the mechanical course unless he has a *bent* in that direction, there is no possible chance for its overslaughing the agricultural course. The new students are about three for the agricultural course to one for the mechanic. We can fill the popular demand for both without impairing either.

Respectfully yours,
EDWIN WILLITS.

AGRICULTURAL COLLEGE, Sept. 30, 1885.

REPORT OF THE PROFESSOR OF AGRICULTURE AND SUPERINTENDENT OF THE FARM.

To the President of the College:

DEAR SIR:—I herewith submit my report of the work of the Agricultural Department, for the college year ending Sept. 30, 1885.

INSTRUCTION.

No changes have been made in the course in Practical Agriculture since my last report.

I have endeavored to keep abreast of the best theories and practice of our time, and to present to my classes such instruction as my own experience has shown me, will be most likely to prove really satisfactory to its possessor—on the farm—not in ideal, but in *actual* agriculture.

Instruction in Practical Agriculture must be largely (to be of real value) of details of practice, learning the characteristics and uses of the animals and products of the farm, the best and most profitable methods of management.

Just what instruction will be most helpful is not easily determined; but our course has been adopted by those who have had years of experience and whose judgment merits respect.

We are sometimes criticised because we do not have more agriculture in our course, others intimate that the course is not extended and scientific enough. Will our critics please, in the light of the subjects treated, suggest what should be omitted that now receives attention, or what in justice could be substituted for any part of the work, and further if any other department is expected to traverse so wide a range of topics in so brief a time?

The whole number who have received instruction in Practical Agriculture during the year, is as follows: Freshman 46, Sophomores 39, Seniors 12; total, 97.

I append here the series of questions used at the examinations of the respective classes during the year as indicating in some degree the topics and the scope of instruction in the *two* and *one-half terms*, devoted to agriculture, in our four years' course.

FRESHMAN EXAMINATION IN DRAINAGE AND BREEDS OF CATTLE.

1. How is the soil affected by evaporation?
2. How does drainage affect soils?
3. Give the mechanical construction of soils and the proper conditions to insure germination of seeds.
4. What fall is necessary in tile drains? How does the water enter the tile?
5. At what depth and distance apart should tile drains be laid?
6. Classify the twelve breeds of cattle we have studied, 1st as to origin, 2d as to adaptation.
7. Give points of difference between a Devon and Hereford?
8. What great breeder improved the Longhorns, and what can you say of his life and work?
9. Name some of the most prominent of the early breeders of Shorthorns?
   a. Name some of the most noted families of Booth and Bates?
   b. Construct an ideal pedigree of a Shorthorn bull to the fourth sire?
   c. Give six of the most important points to be considered in judging Shorthorns.
   d. Why is a record of pedigree desirable, and what steps are to be taken to secure the registration of Shorthorns?
10. Describe a typical animal, 1st for the dairy, 2d for beef production.

FIRST HALF TERM SOPHOMORE EXAMINATION.

Sheep.

1. Define growth and condition as applied to wool?
   a. Upon what does each depend?
   b. Grade wools. From what breed or crosses does each grade come?
   c. How does yolk affect wool?
2. Name the English breeds of sheep?
   a. Compare a Cotswold and South-Down, (1) size, (2) weight of fleece, (3) color, (4) early maturity and quality of mutton?
   b. Which of the English breeds is most popular in this country? What are its special points of merit?
3. What is the origin of the American Merino?
   a. What are its chief points of excellence?
   b. When and by whom were the first importations of Merinos made?

Swine.

4. Name and classify breeds of swine?
   a. Compare a Berkshire and Poland China as to origin, color, ears, size, early maturity, quality of hams and bacon?
   b. Compare a Duroc Jersey and Essex?
5. Give rules for the selection of breeding swine?
   a. Give period of gestation of sow. What care and food are best during this period and at the time of farrowing?

Horse.

6. Give natural history of the horse?
7. Give three rules that apply in breeding horses?
8. Give points of difference between a Suffolk Punch and Englishshire? Give points of difference between a Cleveland Bay and Clydesdale. Give points of difference between a Percheron and Thoroughbred?
9. Period of gestation in mare? What food and management should she have during this period?
   a. What sign would indicate a stain or defect in the pedigree of a thoroughbred?

SECOND HALF TERM SOPHOMORE EXAMINATION.

Feeding of Animals. (*Stewarts.*)

1. What important elements of animal and vegetable substances are identical?
2. What must the food of animals contain? How does the work of the plant differ from that of the animal?
3. Define and give examples of a nutrient—a ration?
   a. What three groups of nutrients are contained in plants? Give examples of each and effects of feeding either alone.
4. Name three principles of alimentation?
5. What % of gain will cattle, sheep and swine make per 100℔ dried substance consumed, per Mr. Lawes' experiments?
   a. What proportion of a full ration is food of growth?
6. How should the food of young animals differ from that of mature ones? Give examples of foods suited to each.
7. Give details and results of Prof. Horsfall's experiment in feeding dairy cows?
8. Best foods for horses and best methods of preparing them?
9. Philosophy of cooking food for stock? Will it pay?
10. Which would be preferable to enrich a Michigan farm, commercial foods or commercial fertilizers? Give reasons for reply.

SENIOR EXAMINATION.

1. Define economy as applied to the farm? (1) in purchase, use and care of implements, (2) buying and selling, (3) selection and care of animals, (4) general management.
2. State four important principles in breeding?
   a. What is a pedigree and what gives it value?
   b. What is meant by an outcross? Is it objectionable in a pedigree?
   c. How does in and in breeding affect offspring?
3. Give important considerations in locating and erecting farm buildings.
   a. Utility vs. Beauty in Architecture?
   b. Order and neatness about premises?
4. Give rotation of crops on College farm? Criticise same?
   a. Is it a good practice to fallow land?
   b. What factors require careful attention in mixed husbandry?
5. Give best methods of making, saving and applying barnyard manure? Upon what does its value depend?
6. On what soils and crops can salt, lime and plaster be used profitably?

8. Write a brief sketch of the history of agriculture.
9. Give your idea of the true scope and value of an agricultural education?
10. What duties does its possessor owe the community and the State?

LECTURES AND INSTITUTES.

I have taken my regular assignment of the Wednesday afternoon lectures and have also attended the Farmers' Institutes to which I was appointed by the Board of Agriculture at Manchester and Flushing and by the request of the local committees, those held at Paw Paw and Albion. I also attended the annual meeting of the National Association of the Breeders of Dutch Friesian Cattle held in Detroit, Feb. 4 and 5, and delivered an address on "Cattle Breeding and Feeding, the Most Important Elements in American Agriculture."

I was present at the first meeting of the Jackson County Shorthorn Breeders' Association in January, and in August I was privileged to meet the farmers of Livingston, Wayne and Washtenaw Counties at their annual picnic at Whitmore Lake.

The Board authorized me to attend the National Fat Stock Show held in Chicago in November and the meetings of all of the National Breeders' Associations held during the same week and in which the Agricultural Department of the college is specially interested.

THE TEACHERS OF AGRICULTURE.

The annual meeting of this association was held at Ann Arbor, during the meeting of the Society for the promotion of Science.

The next meeting is to be held at Purdue University, Lafayette, Ind.

IMPLEMENTS.

A Bullard hay tedder has been purchased direct from the makers, The Belcher & Taylor Agricultural Tool Co., Chicopee Falls, Mass.

A Eureka mower from the Eureka Mower Co., Utica, N. Y., both giving excellent satisfaction. A Thomas smoothing harrow from W. L. Herendeen, Geneva, N. Y., and a Barlow rotary corn planter from The Vandiver Corn Planter Co., Quincy, Ills.

A Eureka fanning mill from J. C. Schneeberger, Lansing, which does excellent work.

We are also using Sperry's agricultural steamers manufactured by D. R. Sperry & Co., Batavia, Ills., in our experimental barn and piggery and do not hesitate to commend it as suited to the wants and means of farmers who desire to cook some food for stock.

We have also purchased a few rods of Ewer's farm and garden portable fence, made by Ewer & White, Battle Creek, Mich.

The Strowbridge broadcast sower, manufactured by the Racine Seeder Co., Racine, Wis., and mentioned in last report has been thoroughly tested this season both in sewing grass seed and clover as well as oats. It is a cheap, simple, easily adjusted and rapid sowing seeder. I cheerfully recommend it to farmers needing a broadcast seeder.

Donations are acknowledged from the following persons:

Geo. M. Selleck, Imlay City, Mich., 1 bushel of Acadian seed wheat.

Thorley Cattle Food Co., Chicago, Ills., samples in quantity of their stock food.

E. W. Blatchford & Co., Chicago, Ills., one bag of stock food.

Packages of imported seed wheats from Col. Coleman, Commissioner of Agriculture, Washington, D. C.

Box of Leaming seed corn from John F. Drew, Jackson.

PERMANENT IMPROVEMENTS.

The tiling of No. 13 has been completed and we have crossed the Grand Trunk R. R. and commenced work in No. 15. When it is remembered that the drainage water from this field must all be carried to the river, nearly a mile away, the magnitude of the system of drainage we are engaged in becomes apparent. The unsightly hole east of the cattle barn has been drained and plowed. No. 16 has in good part been underbrushed, picked up and burned. About two acres of timber still stands, which I think should be cut the coming winter, so that the clearing of this field may be completed.

On account of the location of the new mechanical laboratory, the piggery has been moved twenty-five rods east and a little south and is now located about ten rods south of the sheep barn, a much better and more convenient site than the one it formerly occupied. A joint floor was laid and then planked similar to the old one. A well driven, and supplied with a good force pump and hose, so that the whole interior can be thoroughly flooded at any time. Yards contiguous to the pens have been enclosed with substantial post and board fence, so that it is all in much better shape than before.

The old wagon shed has been taken down, as it was unsightly and implements could be stored elsewhere.

The last Legislature appropriated $300 for the erection of a new wind mill and the taking down and repairing of the old one and erecting it near the Grand Trunk R. R., in No. 15, to supply the permanent pasture fields with water for stock.

With this appropriation a new Manvel wind mill was purchased and erected on the site of the old mill taken down. This pumps the water into a ninety barrel supply tank, whence it is conveyed in pipes to the experimental and sheep barns and to a twenty barrel tank east of the cattle barn. These tanks, have all been enclosed as well as the pump in good shape, which makes our water supply at the barns for stock constant and easy of access and I believe it is so thoroughly protected as to give us little if any trouble by freezing in the tanks.

The old mill has been thoroughly repaired, the derrick lengthened some twenty feet and substantially erected, and pump enclosed in No. 15. A fifty barrel supply tank receives the water and pipes carry it to twenty barrel tanks, in each of fields Nos. 15, 16, 12, 13 and to a smaller tank in No. 14. The pipes are arranged so that the tanks can be emptied during cold weather, as this mill is intended only to furnish summer supply. This arrangement gives us plenty of stock water in each of these permanent pasture fields. Its value to our stock cannot be over-estimated and its good results are plainly apparent in the thrift and better condition of our cattle over other seasons without any other change except plenty of pure water whenever they wanted it I am convinced that cattle will do better on short feed and plenty of water than on flush feed and lack the water.

The contract for the building of the tanks and erection of the mills, furnishing pipe and pumps, &c., was taken by the firm of Jas. Rork & Bro., North Lansing. Their work was done in a most satisfactory manner and reflects credit on the

firm. Everything about the mills, pipes, pumps, float, valves, &c., have worked without any trouble from the start and a three months' trial seems to justify our confidence in the quality of their work. The skill and mechanical genius of their foreman, Mr. Joseph W. Gunnison, an old student of the college, deserve mention.

EXPERIMENTS.

The proposed feeding experiments referred to in my report a year ago were carried out with the assistance of Mr. H. D. French of the Senior class. The results were embodied in a bulletin issued in July and also published in the last report of the State Board of Agriculture.

The Legislature at its last session appropriated means to carry on these experiments. I had desired to secure two calves of each of the leading breeds as nearly of the same age as possible, and then under same conditions, except amount of food, to feed them together until three years old. Could good specimens of the Hereford, Shorthorn, Holstein Galloway, Polled Angus, Ayrshire, Devon, Jersey and native be procured and fed in this way, they could not fail to be an object lesson of interest and profit to all interested in growing cattle, from the beginning to the close of the feeding period. A careful record of all food consumed and the comparative data as to food, of growth, time of maturing, gain for food consumed, etc., would be of permanent value. Breeders may make fair or extravagant claims for their favorites; but too often the claim has little foundation, except "I guess so." Actual knowledge of the value of breeds is what we want. It seem somewhat difficult to get the animals to start with, Hereford and Holsteins especially.

At our spring sale in March, Mr. H. H. Hinds, President of the Michigan Shorthorn Breeders' Association, who has always manifested a cordial interest in all of our work presented this matter to the State Board of Agriculture and thought that the different Breeders' Associations would be glad to donate the calves, selecting such as they believed would be likely to make the best showing for the respective breeds. Mr. Robert Gibbons, editor of the Michigan Farmer, was present, and I herewith append his report of the remarks of Mr. Hinds and the resolutions adopted by the Board.

TESTING THE BREEDS.

At the stock sale at the Agricultural College last week, all the members of the State Board of Agriculture being present, Mr. H. H. Hinds, President of the State Shorthorn Breeders' Association, after a few words of explanation, made the offer that if the Board would select one or two choice specimens of each of the beef breeds, of about the same age, giving them equal care and attention, and keeping a full record of the feed consumed and the gain made by each, he, on behalf of the Shorthorn breeders, would offer such selected animals free of expense to the college. He said he did this without consultation with his brother breeders, but he knew they would stand by him. He wanted to see the breeds tested fairly, and each represented by animals selected by the friends of the breeds to represent it. He would also like to see some good native steers, free from any admixture of thoroughbred blood, fed with the others, so as to bring out the true merits of each. These animals could then be exhibited at the State and other fairs, and farmers could draw their own conclusions. The college was in shape, since its experimental barn was built, to conduct such an experiment with the carefulness and attention to details it should have, and he hoped breeders of each of the beef breeds would take an interest in such a test.

The members of the Board, after some discussion among themselves, in which all spoke favorably of the proposition, unanimously adopted the following preamble and resolutions:

WHEREAS, The Michigan Shorthorn Breeders' Association, through its President, has volunteered to select and furnish two specimens of Shorthorn calves for the purpose of testing their relative feeding qualities compared with other breeds, therefore,

Resolved, That the Michigan State Board of Agriculture accept the proposition and respectfully solicit other associations or owners of other breeds to select two specimen calves of each of the several breeds for the purpose of making a careful test at the Agricultural College of their relative merits for fattening purposes. Correspondence in relation to the test should be addressed to Prof. Samuel Johnson, Agricultural College, who will furnish information in regard to it.

Now, let the Hereford, Polled Angus, Galloway and Devon breeders be heard from, and we shall have a test of the merits of each of the great families of thoroughbreds that will demonstrate their high merit and the value of each to the farmer. It will be a liberal education in feeding to have such a test thoroughly made.

There is no lack of public spirit among our cattle breeders, many of whom have expressed a desire for such a test; but many feel, and I cannot help sympathizing in the feeling, that the State is abundantly able to purchase the stock needed for its experimental work. The members of our State Board feel in this way and I think, as some six months have elapsed since the adoption of the above resolution and no offer of calves has been made, we had best conclude that if we are to have specimens of the breeds to feed we must buy them for that purpose.

The outlay required will be as much or more perhaps than the animals will bring after three years' care and feeding; but we must not forget that experiments are not remunerative directly in a pecuniary way—only in the lessons gleaned from them and the conclusions they demonstrate.

I therefore recommend that a portion of the amount appropriated for feeding experiments be expended for animals for this purpose, and that they be secured as soon as possible, at the same time holding ourselves in readiness, to accept selections made by any of the Breeders' organizations pursuant to the resolution adopted by the Board of Agriculture; provided the animals in these classes have not been previously secured.

STOCK.

Since my last report some very desirable additions have been made to the college herds. In November last, Hon. F. Wells and myself attended the cattle sales held during the week of the Fat Stock Show in Chicago.

From Mr. T. L. Harvey, of Turlington, Nebraska, we purchased Jenny Baldwin, a young Mary, Lady Catherine, a Princess, and imported Red Rose of Derwent, bred by Geo. Fox, Esq., of Staffordshire, and sired by his $12,000 bull, the 24th Duke of Airdrie. These have all dropped strong and vigorous calves since coming to the College farm, sired by 33d Duke of Airdrie, sold at same sale for $3,300. The following day we bought at the sale of I. Barr & Son, Davenport, Iowa, the two year old Phyllis heifer Meadow Belle, and the imported four year old Cruikshank cow Victoria 71st from the celebrated Scotch herd. The heifer dropped a heifer calf in December by the imported Cruikshank bull, imported Julius Cæsar (18,073). The cow did not prove in calf and has been a little shy in breeding, but by change of conditions and reducing the flesh she promises to be of use. She is a fine specimen and we prize her highly.

In May, at the Chicago sale of T. C. Anderson, of Side View, Kentucky, we purchased a ten months old Shorthorn bull, Fennel Duke 2d, of Side View. We think him a very promising animal and hope he may prove a worthy successor to Col. Acomb 2d, who has headed the herd for the past four years. These purchases, with the many good animals on hand, has put our Shorthorn herd in very creditable shape.

The members of the State Board of Agriculture, recognizing the increasing attention paid to the Hereford breed of cattle in our State, thought they should be represented here in a small herd. Mr. Wells and myself were authorized to attend the sale of Burleigh & Bodwell, held at Chicago in May, and purchase in our discretion two or three good females.

The imported cows Daisy and Lady Agincourt, (the latter with bull calf Argyle) and Dove, a two year old heifer, were purchased. Daisy and Dove have dropped calves since the purchase. This gives us, with the cow Lemon, seven head of Herefords.

A Polled Angus calf was purchased at the same time for experimental feeding.

The six Shorthorns cost	$2,060 00
The four Herefords	1,030 00
The Polled Angus	85 00

We have added to our stock of Poland China swine, by purchases from Barnes Bros., Byron, Mich., and to the Berkshires from the herd of Messrs. Turner & Hudson, Lansing.

Four imported Shropshire ewes bred by H. Lovatt, Esq., were purchased from Mr. C. Hills & Sons, Delaware, Ohio, who brought them over last season. They have just reached us and seem to be fine specimens of this popular breed.

A pair of grade Clydesdale mares three years old and weighing 3,000lb was purchased of Mr. J. M. Turner, of Lansing, in April last. They are active for large horses, gentle and hardy, possessing all of the qualities needed in a good farm horse.

This gives us a pair of grade Clydes to work by the side of the grade Percherons secured by exchange a year ago and is in accordance with the wishes and instructions of the Board, who thought it desirable to test in this way the comparative merits of these two popular breeds of draft and all work horses.

PUBLIC CATTLE SALE.

In my last report I suggested to the State Board of Agriculture the feasibility of disposing of our surplus stock at public sale. In the nature of the case it must be an experiment, but there were many things about the plan that seemed to warrant the trial. After due consideration the Board authorized the sale and appointed President Wells and myself as committee in charge to make the needed arrangements. We decided to hold the sale March 25. I compiled a catalogue of the stock offered and had eight hundred copies printed.

The day was propitious and the sale was largely attended by intending purchasers from different parts of the State. Gov. R. A. Alger and a large number of the members of the Legislature were present during a part of the afternoon. It called together a large number of persons, who had never visited the college and knew very little of its work. And while it proved to be a very satisfactory way of disposing of our surplus animals, the members of the State Board of Agriculture, who were all present, were unanimous in their expression

of opinion that the sale had proved to be a most satisfactory way of bringing the college to the attention of those for whom it was organized, and that it had proven a much greater success than they had anticipated. They have decided to hold annual or biennial sales hereafter as the condition and numbers of our herds will warrant.

Mr. J. A. Mann, of Kalamazoo, officiated as salesman, and his services were very satisfactory.

I append a notice of the sale by that staunch and tireless worker in the interest of good stock for Michigan, Editor-in-chief Gibbons of the Michigan Farmer.

THE COLLEGE SALE OF SHORTHORNS.

On Wednesday last, as previously announced, the sale of a draft of Shorthorns from the herd at the Agricultural College, together with a few Ayrshires, some grade cattle and Berkshire hogs took place. The principal interest centered in the Shorthorns, and buyers were present in goodly numbers from various parts of the State. After lunch, Prof. Johnson called the crowd together in the large yard in rear of the cattle barns, and explained the object in making the sale, the condition of the cattle, etc., and then Mr. J. A. Mann, the auctioneer, spoke of the terms under which the sale was to be made, and expressed the hope that the buyers present would be lively and bid promptly up to what they considered the cattle worth. The sale then began, the animals being offered in the order catalogued. The following is a list of the animals sold, purchasers, and prices paid:

College Red Rose, yearling, J. C. Sharpe, Jackson	$145 00
College Red Rose 2d (shy breeder) D. B. Hale, Eaton Rapids	75 00
Hela 4th, James M. Turner, Lansing	110 00
Horatio 6th, bull calf, J. M. Turner, Lansing	50 00
Hela 7th, two year old heifer, Hugh Alexander, Evart, Osceola Co	85 00
College Hebe, yearling, J. C. Sharpe, Jackson	90 00
Hela 6th, C. G. & J. R. Learned, Port Austin	105 00
Horatio 3d, yearling, William Callum, East Saginaw	100 00
College Peri Duchess 2d, J. C. Sharpe	240 00
College Duke 2d, calf, Fred Spicer, Eaton Rapids	65 00
College Phœnix 2d, yearling, W. J. McIlvain, Evart	95 00
Hercules 2d, calf, S. Barnard, Ypsilanti	175 00
Heroine 4th, H. Alexander, Evart	110 00
College Hermia, S. Barnard, Ypsilanti	140 00
Hamlet 6th, calf, Frank Willson, Jackson	85 00
Hela of Lansing, F. Schultz, Lansing	160 00
Handsome Hela 3d, J. C. Sharpe, Jackson	115 00
College Hermia 2d, yearling, H. Alexander, Evart	45 00
Heroine 2d, Perry Brown, Vernon	90 00
Helianthus 2d, E. W. Beckwith, Cassopolis	60 00
Hela T, yearling twin heifer, J. McIlvain, Evart	60 00
College Duchess, one year old, C. G. & J. R. Learned, Port Austin	230 00
Heroine 5th and calf, T. J. Monroe, Portland	185 00
Handsome Hela, J. C. Sharpe, Jackson	185 00
Horatio 4th, calf, J. T. Monroe, Portland	125 00

This completed the sale of Shorthorns, and upon its conclusion three Ayrshires were put up. W. A. Newton, of Lansing, purchased the heifer Lula for $30, and Messrs. C. G. & J. R. Learned the heifers Phyllacy Linden and Susette for $35 and $30 respectively. A. E. Andrews, of Williamston, got a Jersey heifer for $60. Some grade stock sold at fair prices, among which was the cross bred Galloway and Shorthorn fat heifer, which went to Mr. Burch, a Lansing butcher, for $85.

Every Shorthorn catalogued was sold, and while the prices were only fair, the dispersion of the animals will be of great benefit to the localities where they go. Not an animal among them but will return a good percentage on the money invested in it if only given a fair chance. The total amount received for Shorthorns was $2,925, an average of $112.50 for the twenty-six head sold, including calves, heifers and cows, and when the season is considered, it may be put down as a successful sale. We feel satisfied the stock will do credit to the college, and bring into notice the very fine herd that is being built up there.

STOCK SALES.

Sales of cattle during year, amount to	$4,764 50
Sales of sheep during year, amount to	281 28
Sales of swine during year, amount to	501 86
Total	$5,547 64

Stock on hand Oct. 1st, 1885:

Shorthorns	53
Herefords	7
Jerseys	4
Ayrshires	3
Holsteins	3
Galloway	1
Angus	1
Cross bred Galloway and Shorthorn	2
Native	1
Total	74

Fifty-five head of swine, embracing three breeds, Poland China, Essex and Berkshire.

One hundred and forty sheep, American Merino, South Down and Shropshire.

The following cropping list for 1885 gives the area and yield of the crops grown upon the college farm:

CROPPING LIST FOR 1885.

Field.	Area.	Crop.	Quantity.	Remarks.
No. 3	23.66 acres	Hay	40¾ tons	10 acres devoted to experimental crops.
		Corn	28 bushels corn	
		Potatoes	82 bushels potatoes	
		Mangolds	277 bushels mangolds	
		....	3 acres ensilage	
		Wheat	124 bushels wheat	
No. 4	19 acres	Pasture.		
No. 5	20½ acres	Potatoes, 3 acr's	346 bushels	4 acres next to river too wet to crop.
		Peas, 2 acres	73 bushels	
		Corn, 11½ acres	531 bushels	
No. 6	27½ acres	Wheat	600 bushels.	
No. 7	17 acres, 11 poles	Pasture.		
No. 8	23 acres, 37 poles	Oats	1,238 bushels.	
No. 9	23¾ acres	Corn	929 bushels.	
No. 10	22 acres	Hay	84¾ tons	Two cuttings.
No. 11	23¾ acres	Hay	34¼ tons	Timothy.
No. 12	23 acres	Pasture.		
No. 13	23 acres	Pasture.		
No. 14	10 acres	Corn	246 bushels.	
No. 15	14 acres	Pasture.		

HIGHWAY TO TROWBRIDGE.

The junction of the Detroit & Northern R. R. with the Grand Trunk is about one-and-a-half miles from the college. It is often very convenient for college people to take or leave trains at the junction, as well as the residents of the vicinity. Unfortunately the highway was some eighty rods from the junction and the only means of reaching it was by walking on the railroad track.

Ascertaining from the owner of land adjacent to the Grand Trunk track that he would sell a strip of land wide enough for a highway, I circulated the proper petition among the land owners, who were only too glad to sign it, praying the Com. of Highways to lay out the highway. After some delays this was accomplished. A deep cut in the route was impassable and there was no means to fill it. I presented the case to the Board of Agriculture who authorized me to expend $75.00 on the road. This has been done and the road is now in very good shape and is a great convenience to our community.

At the close of the fall term 75 trunks were shipped from the junction 1½ miles from the college that otherwise must have gone to Lansing, a good part of them to Grand Trunk depot 4½ miles away.

This will give something of an idea of the saving effected by this action and outlay.

ENSILAGE.

The college silo was filled in Sept. last. The ensilaged corn came out in excellent condition. Continued feeding of ensilage only confirms me in the

claims that I have for some years urged respecting this method of preserving fodder.

Ensilage is a cheap substitute for roots, and gives in convenient form an appetizing, healthy food for our stack, during the long period they must be confined in stables. It should never be the only food of the animal, but fed in connection with some grain and dried fodder to secure the best results. It has passed the trial period and has come to stay. Silos have been built all over the country, and without exception, so far as I can learn, when a silo has been filled properly and *its contents fed judiciously by a practical cattle man*, it has proved satisfactory. Some visionary people who have seemed to think that ensilage was to revolutionize cattle feeding and that it would supplement the lack of *care and common sense* in feeding and management, have as a matter of course been disappointed, and a few of our farm journals have taken special pains to call the attention of the public to these examples of failure.

QUERY.—Is it because the papers, or their contributors took the wrong side of this question on the start, and have been trying to prove themselves consistent ever since, that they maintain this antagonism?

The English Parliament recently appointed a committee to investigate and report upon this method of preserving fodder as likely to be of great importance to agricultural interests. This committee, composed of some of the best known men in the kingdom, after taking a large amount of evidence from those who had built silos and fed ensilage, and after the most thorough examination of the subject, have made a most favorable report. They say that "all the evidence seems to show that a nourishing, useful food for animals can be preserved by this process." They further report "that the testimony of the dairy farmers *does not justify* the assertion that dairy products are injuriously affected by ensilage, but that on the contrary it distinctly improves the yield of milk and cream and the quality of the butter — the silos in Great Britain have doubled in number in the last twelve months — and that the evidence warrants the extension and development of the system as a valuable auxiliary to the farm."

We have been favored with visits from committees appointed by the executive committee of the State Agricultural Society and the State Grange. The Shorthorn and the Holstein Breeders' Associations also visited us during their annual meeting in December last.

The college, to be useful and accomplish its proper work, must have the respect, support and sympathy of these and other kindred agricultural associations in our State, and all legitimate means to cultivate pleasant and intimate relations should be improved. The kind words of commendation and the friendly criticism of many of our leading farmers and stock men have been a source of gratification as well as of encouragement to me in my work

In April, Mr. Abram Birch, the foreman of the farm for the past five years, resigned his position to take charge of his father-in-law's farm. I desire to record my appreciation of the services of Mr. and Mrs. Birch during these years, in what is in many ways, a trying position. They had proved themselves efficient and faithful, our relations had been of the most pleasant character, and I regretted to part with them.

Mr. L. E. Snyder filled the position very acceptably until September 1st, when Mr. H. D. French, class of '85, took charge.

Mr. and Mrs. C. W. Ayres were secured to take charge of the farm house, and have done so acceptably.

Mr. Wm. Brown has rendered efficient service as herdsman. In this responsible position his fidelity, constant service, and pleasant ways, deserve cordial commendation.

To those named, as well as to all employés of the Department, I am under obligations for cheerful acquiesence in my plans. Whatever of success we have achieved is largely due to their generous support.

Respectfully submitted,
SAM'L JOHNSON,
Prof. of Agriculture and Supt. of the Farm.

REPORT OF THE PROFESSOR OF HORTICULTURE AND LANDSCAPE GARDENING.

To the President of the College:

With this report is concluded the third year of the Department of Horticulture and Landscape Gardening as a separate feature in college management and instruction. Horticulture and landscape gardening have a longer history than that embraced within these three years, however. Hitherto these subjects had been associated with botany under the management of Dr. Beal, and through his work, both here and among the fruit growers of the State, arose the demand for an enlargement of instruction in horticultural matters. The work of the Department itself was initiated and outlined by my immediate predecessor, Prof. Satterlee. It is now highly proper, therefore since the Department has been created and its usefulness is in a measure assured, to present a brief outline of the work it aims to accomplish.

It is the purpose of the Department to work with the horticulturists of the State and so far as possible to meet their demands in experiment and instruction Its work naturally falls under two heads, so far as instruction is concerned: out-door illustration and practice, and class-room instruction. In most directions the means of out-door illustration are comprehensive. It is to be regretted that our climate is too rigorous to allow of the cultivation of peaches. sweet cherries and some other fruits. I apprehend, however, that some of the mischief which has been attributed to hard winters has been due to insufficient drainage or other causes.

The most notable new feature of the department is a fruit garden which has been set apart this year for the double purpose of testing new varieties of small fruits and of furnishing illustrative labor to students. It comprises four acres of variable soil. It has been enclosed in a double windbreak composed of a row of maples alternating with a row of spruces. It is expected that the maples shall be removed when the spruces become large enough to afford protection. A thorough system of tile drainage is being placed under the garden. Most of the fruits which are growing in the fruit garden were set last spring, or early this fall in the case of strawberries. A catalogue of these and other fruits is published in Bulletin No. 7, which has just been issued. There are forty-seven varieties of strawberries, representing three or four distinct species, fifteen varieties of raspberries, ten of blackberries, ten of currants, five of gooseberries, two of quinces, and a number of the newer grapes, pears and cherries. There

are also Russian apricots in variety, several mulberries and various seedlings of promising wild fruits. The care of this garden is placed entirely in the hands of students who work under the direct supervision of myself or my foreman. So far as possible the student is given class-room instruction upon the nature and culture of the plants he handles before he takes up the work in the garden. It is impossible in the fruit garden, as in all other directions, to give all the students practice in all the operations of small-fruit growing. When there is insufficient work in any direction to give to all the students who work in the department, it is given to those who especially require it. In this manner we give the first choice of work in fruit growing to those who expect to follow it after graduation, and the same principle is true of work in the orchards, vineyards, vegetable garden and on the lawns. It is not expected, however, that the work alone in any of these directions can make an accomplished fruit grower or gardener. Much depends upon the student. We encourage the presence of all students in the gardens and expect that they shall ask questions upon any subjects connected with our work. It is this interest on the part of the student that promises the most practical results

The orchards are two in number, comprising apples, forty-eight varieties; crabs, five varieties ; pears, thirty-six varieties; cherries, eight varieties; plums, seven varieties. The apple orchard has never been a success so far as productiveness is concerned, although it has yielded some good results in the way of experiment. The first difficulty with the orchard is wet feet. A part of it is low with a retentive subsoil. At present writing the drainage system of the orchard is receiving a thorough overhauling. Last spring students gave the orchard a thorough pruning, elevating the tops of the trees so that it was possible to plow under them. The orchard was thoroughly plowed and cultivated, all sod was removed from about the trees, the trunks were scraped and a general renovating was given. I have confidence in the orchard. It is certainly useful for experimental purposes. A part of the orchard is well loaded this year. The pear orchard is just coming into bearing. It is remarkably vigorous and promising. The plums, which had been injured previously by premature falling of the leaves, came through last winter in a weak condition. We shall plant again where necessary, however.

The are two vineyards of considerable extent and a smaller one containing some of the new varieties. Altogether, we are growing sixty-three named varieties and a number of hybrids and seedlings. This year the grapes have been given much attention and we are confident of a good crop next year. In one vineyard we shall put up an illustrative system of trellises to represent to students all the methods of out-door training. In the vineyards, as elsewhere, the work is done by students.

The vegetable garden comprises seven acres. It is carried on as a market garden under the immediate supervision of my foreman, Mr. Charles S. Crandall, who combines with experience a commendable zeal and energy. In fact, to him is due great credit in all work of the Department. Special attention is given to the construction and management of hot-beds and cold frames. We are now constructing, largely by way of experiment, a hot-bed and forcing-house, to be heated by hot air from a home made coal furnace.

The features briefly outlined above, with the methods and appliances accessory to them, comprise the means of out-door illustration in horticulture. In most regards they are sufficient to enable a diligent student to obtain the practical operations of the art. As yet we are entirely unsupplied with any means

for storing or evaporating fruits and vegetables, for collecting and preserving specimens for class illustration, for providing green-house or forcing-house instruction, or for carrying on much necessary in-door work in cold weather; but I am confident that, as the Department grows, these means will be provided.

The class-room instruction in horticulture now extends through four and a half months, six weeks of which is elective. As an indication of the ground covered by the present term's lectures, I submit the following:

BRIEF SYNOPSIS OF LECTURES ON HORTICULTURE.

I. General Introduction.

1. Origin of cultivated plants.
2. Extinction in wild state due to cultivation.
3. Variations of cultivated plants.
   a. Nature of.
   b. Causes of.
      (1.) Excess of food.
      (2.) Change of latitude and climate as affecting size, form, color, productiveness, flavor, hardiness, etc., with discussion of acclimation.
      (3.) Cross-breeding and hybridization.
      (4.) Inheritance.
      (5.) Bud variation.
4. Methods of cross-fertilizing.
5. Nomenclature of cultivated plants.
6. Propagation of plants.
7. General discussion of fungous diseases.
8. Wild fruits worthy of attention.
9. Weeds.

II. Vegetable Gardening.

1. General methods and considerations.
   a. Capital.
   b. Land.
   c. Fertilizers — stable manures, commercial fertilizers.
   d. High culture — tillage, double cropping.
   e. Cold frames, hot beds, forcing houses.
   f. Transplanting.
   g. Vitality of seeds.
   h. Marketing.
   i. Storing.
   j. Irrigation.
2. Concise specific directions for growing all garden crops, with remarks upon history, botanical features and peculiarities of variation of each.

III. Pomology or Fruit Growing.

1. General methods and considerations.
   a. Methods of improving fruits.
      (1.) Chance growing of seedlings.

(2.) Theories of VanMons and others.
(3.) Cross-breeding and hybridizing.

b. Nursery practices.
c. Grafting and budding. Influences of stock on graft and graft on stock.
d. Nomenclature.

2. *Orchard culture. Discussions of apples, pears, quinces, peaches, plums,* cherries, etc., in each case following this synopsis:
   a. Varieties.
   b. History. Regions of highest development.
   c. Soil, drainage, manures.
   d. Cultivation.
   e. Pruning, top grafting.
   f. Harvesting and marketing.
   g. Fungous and other diseases. (Insect troubles are discussed at length by Prof. Cook.)
3. Vineyard culture, following above synopsis.
4. Small fruit culture, following above synopsis in the discussion of strawberries, raspberries, blackberries, currants, gooseberries, cranberries, huckleberries, etc.

IV. MISCELLANEOUS MATTERS.

1. Commercial seed-growing.
2. History of horticulture.

Aside from the regular work in horticulture I have the Juniors in essay writing as a part of their rhetorical exercises. These Juniors are also taking horticulture, and I have assigned to them outlying subjects connected with their study and such as to demand investigation in both the field and the library. I submit the

EXTRA THESES IN HORTICULTURE.

Double fruits, their nature and cause.
The genus Morus, its botanical and economical status.
Differences between the apple and the pear.
Leaf glands of peaches, plums, cherries, and apricots.
Effects of autumn setting, with experiments.
The genus Allium, its botanical and economical status.
The genus Brassica, its botanical and economical status.
Windbreaks for horticultural purposes.
Variations of raspberry leaves.
Productiveness of weeds.
Methods of propagating onions.
The weeds of our garden.
The flowers of watermelons and muskmelons.
The flowers of pumpkins and squashes.
Sweet herbs for the garden.
Botanical structure of Indian corn, and methods for cross-fertilizing it.
Culture of horse-radish, and changes produced by cultivation.
Best time and methods of planting tree seeds, especially nuts.
The genus Pyrus, its botanical and economical status.
The genus Ribes, its botanical and economical status.

Autumn buds of apples, pears, plums, and cherries.
Autumn tints of foliage.
Tomatoes and peppers, and methods for crossing each of them.
The genus Prunus, its botanical and economical status.
Asparagus, its cultivation and botanical characters.
The Umbelliferæ; what has it contributed to the garden, and how?
The genus Fragaria, its botanical and economical status.
Rhubarb, its culture and botanical characters.
History of the dahlia and its culture.

The college is fortunate in the possession of an unusually fine park which mbraces one hundred acres of undulating and broken surface. Ten profesors' residences are arranged along one side of this park, while the central and ear portions are occupied by the college buildings, some twenty in number.)pposite the residences, the park is skirted by Red Cedar river, a part of whose anks are high and precipitous, its whole length skirted with native trees and ushes. The grounds are laid out under the dominant features of the pictursque, and in the main the individual objects are arranged with excellent taste. 'he preservation of natural undulations of surface, and of wooded banks and orest trees, with the entirely natural growth of spruces, is especially fortunate. 'he grounds illustrate all the important principles of picturesque gardening. 'he selection of ornamental plants is large and instructive. During the lectres on landscape gardening, I take the students out of doors and point out to hem the salient features of gardening. I have also required them to write own and describe those portions of the grounds which, to their minds, best llustrate the principles of apparent increase of extent, foregrounds, variety, implicity, richness, polish, snugness, seclusion, gradation, appropriation, daptation, gaiety, tranquility, sombreness, poverty, etc. I add the following:

BRIEF SYNOPSIS OF LECTURES ON LANDSCAPE GARDENING.

. INTRODUCTION. GENERAL DISCUSSION OF THE FINE ARTS.

Principles of painting and their relation to landscape gardening.

I. IDEAL LANDSCAPES.

1. Natural landscapes.
   - *a.* Imitation of nature.
   - *b.* Interpretation of nature
     The Picturesque and the Beautiful, comprising discussions of unity, harmony, variety, simplicity, contrast, appearance of extent, foregrounds, gradation, connexion, snugness, seclusion, adaptation, appropriation, richness, polish, gaiety, quietness, sombreness, poverty.
2. Artificial landscapes.

II. APPLIED LANDSCAPE GARDENING.

1. Parks and paddocks.
2. Cemeteries.
3. Highways, avenues, etc.
3. Homes and private grounds, including discussions of sites, convenience, economy, walks and drives, lawns, windbreaks, trees, shrubs and flowers.

EXAMINATION QUESTIONS IN LANDSCAPE GARDENING.

1. Name the fine arts. Difference between imitation and interpretation of nature.

2. *Name the divisions of landscape gardening; also give the* leading differences between the beautiful and the picturesque.

3. How do you increase appearance of extent? Illustrate gradation.

4. *Define variety. How is it attained?*

5. What is appropriation? Name three important points in the adornment of highways.

6. *What are the leading characteristics of formal gardening?*

7. How can we produce gaiety?

8. Name five points to be considered in the selection of a site for a residence.

9. Name some importannt points in the adornment of cemeteries.

10. How would you make a lawn?

11. Describe an ideal group of trees.

12. Describe an ideal windbreak.

13. Where should we plant Lombardy poplars ?

It is the endeavor to illustrate the lectures both in horticulture and landscape gardening, by actual practice, although, of course, it is impossible to ever fully realize the effort. Necessarily, some of our work is not illustrative. I transcribe from the work-book, the following routine of work, selected at random, for a student during July: Pruning apple trees; weeding onions; mowing with a lawn mower; potting strawberries; shovelling earth; cleaning apple trees; pruning young wood from vineyard; picking peas; cleaning drive; cleaning and trimming drive, ditto; ditto; scraping apple trees; raking on drive; ditto; ditto; pruning grapevines; raking and trimming drives; ditto. Two-thirds of this was fairly illustrative. In this case the young man had expressed no preference for any particular labor. I will take another instance for the month of June: Killing currant worms; poisoning cabbage worms; ditto; ditto; repairing bridge on lawn; planting apricots; applying commercial fertilizer to cabbages; working on cold-frames; pruning apple trees; planting various vegetable seeds; poisoning potato bugs; ditto; ditto; removing cold-frames; poisoning potato bugs; ditto; transplanting celery; picking gooseberries; picking peas. This student had expressed a desire to kill injurious insects. One or two who desired to work in the orchards did four-fifths of their work in pruning, scraping, training, etc. For all students who desire it, I lay out experiments in the garden, orchards and vineyards, and give instruction in methods of manipulation and original investigation. Many of those who are taking the lectures in horticulture this fall will conduct experiments next year in methods of culture, cross fertilization, and in other directions. I am also endeavoring to give my students actual practice in budding, grafting, making layers, cuttings, etc. During the cold weather of early spring I shall conduct indoor work with root grafting and other matters so far as our accommodations will permit. I shall also endeavor to give every student practice in criticising varieties of fruit. In their seasons, collections of many varieties of strawberries, raspberries, grapes and other fruits, upon labelled plates, will be put before the students for testing. The students have taken hold of the work cheerfully this summer.

From the active horticulturists of the State the Department solicits commu-

nications and suggestions. It is proposed to inaugurate as many experiments as our means will admit for the benefit of fruit-growers and others. The means and appliances of the Department are very limited in this respect. However, many experiments are under way. The most prominent at present is the testing of new fruits and vegetables. We solicit new varieties from originators, desiring, especially, to secure them before they are put upon the market. We are attempting the improvement of promising wild fruits. The first essential to successful experiment is a systematic record. In order, therefore, to make an exact record of the whole visible biography of all our cultivated plants from sowing to maturity, arrangements have been made for competent observers—one for the fruit garden and orchards, one for the vineyards, and one for the vegetable garden—to make daily notes throughout the season upon conditions of plants and important phenomena of growth and structure. This arrangement will enable us to present in systematic tabulated form the seasons of germination and maturity, the period of the plant's greatest and least vigor, the exact external influences of culture and weather, the detailed characteristics of leaves, flowers and fruits, and many other highly important features of experiment.

This report, so far as this paragraph, was published and distributed to the press and to to the horticulturists of the State as a "Statement concerning the Department of Horticulture and Landscape of the Agricultural College of Michigan." It received extended and favorable commentfrom the press, and I hope that it has awakened an interest in the college among our very extensive fruit-growing population.

The improvements upon the college premises, so far as the work of the Department is concerned, have been extensive in certain directions. The removal of over a hundred trees has improved our landscape in many places. The most patent fault with the grounds is the sombreness of expression. This fault must be corrected by the judicious removal of trees and by the introduction of attractive flowering shrubs. The drainage of the apple orchard and vegetable gardens has been overhauled. The cat-hole east of the farm house has been drained in the most thorough manner by Mr. C. M. McLouth. We intend to grow crops upon it next year.

The needs of the Department are many and urgent. The supply of tools of all sorts is small and poor. There is no suitable room for keeping tools, for packing, sorting or storing fruits or vegetables. The basement of College Hall which is now used for this purpose, is dark, damp, and cold, and in every way entirely unfit for our use. It is also much too small. The storing of vegetables in the basement is unwholesome. The basement should be used wholly as a store-room for College Hall, having ash bins built in. The present method of storing ashes in barrels is bungling and unsafe. The Department needs a work-room which can be used in cold weather. Many students desire to carry on illustrative labor in root grafting and in other directions, but which cannot be done to any extent with our present accommodations. We have been obliged to work out of doors and in a cramped corner of the horse barn during the cold weather in making mats for hot-beds, and in doing other work which is illustrative and attractive to students. We have no place for keeping seeds or for preserving specimens for class instruction. We have been obliged to sell nearly all our vegetables at a sacrifice this fall for want of any place for storing them. The instruction has been largely suited to our means of illustration; consequently it has been fragmentary and unsatisfactory in many directions. There has been given no adequate instruction in the important matters concerning

the propagation of plants, in floriculture, forcing-house and green-house practices, and in numerous vital particulars.

During the whole year an especially gratifying feature has been the readiness and in many cases the eagerness with which the students have entered into the spirit of all labor which is illustrative. This fact is indication enough that no pains and effort should be spared to render all features of illustrative labor *prominent. As yet we have no means for furnishing educational* labor.

Respectfully submitted,

L. H. BAILEY, JR.,

Professor of Horticulture and Landscape Gardening.

OCTOBER, 1885.

REPORT OF THE PROFESSOR OF CHEMISTRY.

President Willits:

The year just closing has been one of busy prosperity in the Chemical Department. The attendance of students in their classes has been prompt, and their work satisfactory.

In the autumn term three classes daily received instruction in this Department, *namely: Seniors in chemical physics; Juniors in organic chemistry,* and the same class in blow-pipe analysis. In the spring term the Seniors had daily lectures in meteorology, and the Juniors three hours daily in chemical analysis. In the summer term, the Seniors had one hour daily in quantitative chemical analysis, the Juniors a daily lecture in agricultural chemistry, the Sophomores a daily lecture in elementary chemistry, and two hours a week in chemical manipulation.

This course in lecturing and teaching would have been impossible but for the efficient aid of my assistant in chemistry, who has done the work of a full instructor, besides his assistance in the care of the laboratory and the apparatus.

OUTSIDE WORK.

In December I attended the Sanitary Convention at East Saginaw, and gave a public address on the water-supply for that city.

In March I attended the meeting of the Sanitary Council of the Mississippi Valley (of which I am a member,) at New Orleans, and presented a report on the means to guard our people from a threatened incursion of cholera and yellow fever. This journey involved a large expense and considerable personal sacrifice.

The question may arise, "Why should a professor in an Agricultural College interest himself in these questions of public health?" I am sure that the public health is a question of the first importance to agriculturalists because all disturbances of production and distribution of public wealth reach the producing class in their final sweep, and leave their abiding impression there. The march of yellow fever from New Orleans to Southern Ohio in 1879 affected the welfare of every farmer in Michigan as certainly as it did the citizens of Memphis in Tennessee or Gallipolis in Ohio. A second outbreak of yellow fever on the banks of the Mississippi, or the sweep of cholera up the St. Law-

rence would exert a marked depression on the prosperity of Michigan. No class of men are more interested in health than farmers, and any effort to promote the public health is not out of place even for a professor in an Agricultural college.

FARMERS' INSTITUTES.

The duty laid upon me by the State Board of Agriculture in arranging for the Farmers' Institutes in the State was duly performed. I attended the Institutes in Flushing and Monroe. The Institutes in the State were held according to the programme adopted by the State Board. These Farmers' Institutes continue to be a power for good to farmers and College alike.

METEOROLOGICAL OBSERVATIONS.

The meteorological observations begun in 1863 by the order of the State Board of Agriculture, have been continued to the present day. The value of continuous observations running through so many years increases with the years in increasing ratio. They cover a longer period than any taken in this State, and furnish the data for an exact study of the meteorology of our State. While the labor of a single observation is trifling, the confinement and care of tri-daily observations for 22 years becomes a burden.

While the Chemical Department has had no startling experiences for the year, and its work has been of the plodding, persistent, every-day-at-work order, yet reasonable prosperity and satisfaction with the results crown the year.

Respectfully submitted,

R. C. KEDZIE,
Prof. Chemistry.

AGRICULTURAL COLLEGE,
September 30, 1885.

REPORT OF THE PROFESSOR OF ZOOLOGY AND ENTOMOLOGY.

To the President of the State Agricultural College:

The work during the past year in my Department has been very pleasant and satisfactory. The students have shown much interest and enthusiasm in their work, and have made good progress.

In the autumn term twenty-two of the Senior class elected zoölogy. The class in anatomy—consisting of Juniors—numbered thirty-six. Divisions of this class numbering nine students, each spent one hour daily in laboratory work under my special supervision.

During the spring term, the Junior class, numbering thirty-one, attended the daily lectures in physiology. During the first half of the term three hours were spent each afternoon in laboratory work. During the last half of the spring term twenty-two Seniors attended the lectures in geology, which are elective.

During the summer term the Junior class, numbering thirty-two, attended the daily lectures in entomology. It is very desirable to have at least two hours a week laboratory work in this study; but owing to the press of other required duties, it was found impracticable for the students to find the time. About one hour daily was given to such as could get the time in the laboratory.

Since the beginning of the spring term Mr. C. P. Gillett of the class of 1884 has been taking post graduate study, looking toward a master's degree. Mr. Gillett has studied very thoroughly and described with illustrations several insects that were discovered to be enemies to various garden and field products.

Mr. Hodges, of the same class with Mr. Gillett, spent some time in the laboratory engaged in histological work. One of the Seniors, Mr. Woodmansee, did much laboratory work dissecting insects.

SUGGESTIONS.

I wish to renew my urgent request that the apiary be made complete and put in charge of some competent assistant. It would be self-sustaining, and at the same time illustrate more fully the science and art of apiculture, would give me needed relief, and would surely add to the number of our students.

I also wish to urge that our manual labor operations be so modified as to make it possible for me to have for each pupil at least two hours each week laboratory work in both entomology and zoölogy. This is granted in all kindred institutions so far as I know, and would add very greatly to the value of these studies.

COLLEGE WORK OTHER THAN INSTRUCTION.

I have lectured once before the whole body of students by special request, and have prepared two of the series of bulletins sent out by the college. One on a new wheat enemy, Isosoma nigrum, and one on the winter management of bees. I prepared two papers for the institutes, which were presented at Plymouth and Manchester. In one of these lectures I treated of the physiological effects of alcoholic drink, in the other of noxious insects.

During the entire year I have taught a large and interesting class in the college Sabbath School. Our study has been given to the life of Paul and to the life of Christ.

EXPERIMENTS.

During the year I have had fully the usual number of inquiries regarding insects. All subjects have been promptly investigated and the desired information given as soon as possible. In many of these investigations I have profited by the aid of Mr. Gillett. Several new insects have been described and illustrated, and such of these reports as have not been published in the last report of the State Board will appear in the next report.

In the spring, I received a large number of bees dead of diarrhœa, that I might make a careful microscopic examination of the excreta, with a view to determining the precise cause of the winter malady. The results were published in all the bee journals.

We have tried many experiments with insecticides, the results of which will appear in institute lectures.

THE APIARY.

Notwithstanding the general and widespread mortality among bees the past winter, our bees wintered very well indeed.

It would seem that our unvarying success almost demonstrated that cellar wintering, in a proper cellar and with proper care, is a certain success. Owing to an accident, mice got into some of our hives, and in two cases utterly destroyed the bees.

We have sold several colonies of bees during the season, and have secured a large harvest of honey.

OUTSIDE WORK.

Last fall I prepared a large and complete collection of apicultural products, instruments, bee plants, bees, etc., for the New Orleans Exposition. I attended the annual meeting of the State Horticultural Society, where I presented two illustrated papers, both of which are published in the annual report of that society. I also presented a paper before the annual meeting of the State Bee Keepers' Association, of which body I was elected president. I have acted as president of the Ingham County Horticultural Society, which holds monthly meetings. By special invitation I presented an illustrated paper on Economic Entomology before the North American Pomological Society at the Grand Rapids meeting. During our August vacation, I attended the meeting of the American Association for the Advancement of Science at Ann Arbor, which was not only a very enjoyable, but a very profitable occasion.

DONATIONS TO THE ZOÖLOGICAL DEPARTMENT.

Miss Helen S. Norton:
Three specimens lava from Sandwich Islands, and 57 specimens of marine shells.

C. H. Judson:
Twenty-one specimens of fossils from Lucas county, Ohio.

Voiselle & Larose:
Two willow Ptarmigans.

A. W. Page:
One ammonite.

W. H. Jessup:
Specimen of partzite.

Lieut. J. A. Lockwood:
Ammonite, 2 baculites, opalized wood, 2 concretions and fossil wood.

Rev. O E. Murray:
Brick of tin. Tin dust.

Gates Stannard:
Kill-deer eggs.

A. G. Nead purchased:
Virginia deer and fawn, gray fox, white rabbit and long-tailed duck.

R. M. Bates:
Fossil brachiopods, crinoidal stems, spirifer, and fossil coral.

Detroit Scientific Association:
Fifty-seven specimens of native woods.

Chas. Smith:
Three specimens marble, selenite, five specimens sulphate of iron, three specimens iron ore. three specimens talc, Turkish emery, two specimens tourmaline, hornblende, two specimens garnets in emery, three specimens Chester emery, serpentine, corundum, Turkish emery wheel, corundum emery wheel, brown hematite, three specimens sandstone, stalactite, conglomerate, granite, two specimens Italian marble, three specimens limestone, umber, two specimens pottery, quartz, iron concretion.

T. A. Stanley:
Cast skin of a snake.

S. D. Peper:
Jaw of bill fish, Florida bean.
A. L. Markuff:
Peduncled wasp's nest.
Student:
Wasp nest. *Vespa vulgaris.*

Respectfully submitted,
A. J. COOK.

REPORT OF THE PROFESSOR OF BOTANY AND FORESTRY.

To the President:

The following in brief is my report for the year closing September 30, 1885.

Having at last been relieved from the teaching of horticulture,—something which I long desired, I have been able to give more attention to botany. So far as is apparent to me, the students are very attentive and exhibit a good degree of interest in the subject, though manual labor and military drill make it quite difficult for those who desire it, to spend much time "botanizing" at the college and in the vicinity. In the autumn term the Sophomores were instructed in systematic botany and in the afternoon of the same term, fifteen Seniors and specials spent two hours a day for four days in the week at laboratory work with the compound microscope. During one day in each week they received a lecture on the subjects investigated.

During the spring term, the Sophomores, in two sections, took a course much like that of the Seniors just referred to.

In the summer term, the Freshmen began the subject, and in two sections had daily exercises in structural botany.

Besides these, eight others, resident graduates or other students, took special work in botany. These were not in the regular classes, but received much attention and had free use of microscopes and other apparatus. They usually made some experiment, and all made observations, drawings and notes

It is very certain that if others knew of our excellent equipments for a great variety of work in botany, a much larger number would avail themselves of the opportunity.

As my work is now mainly confined to teaching botany, it is likely to be little understood or appreciated by those who have a limited knowledge of the subject.

Only eighteen years ago, our best colleges and universities, including Harvard, required but six weeks of botany, with a chance to elect a few weeks more in learning to find out the names of plants.

It is only a ltttle over twelve years since the foremost colleges of our land begun to introduce laboratory work with the aid of compound microscropes and other apparatus.

Now, and for some years past, all of our students have been required to spend five-sixths of an academic year with daily exercises in botany, and then they have an apportunity to elect still more. Half of this time is devoted to laboratory work in the study of plant-physiology, by which students learn how plants are put together, and how they grow, including many things pertaining

to the movements, fertilization of flowers, and minute plants which are parasitic and injurious.

To give a little notion of the kind of work done in a modern botanical laboratory, I will mention a few examples:

Recently, a person who is now a professor of agriculture, spent one term in the study of the wheat plant, including the intricate structure of the kernel and germinating plant. Another, who is now a professor of horticulture spent over a term in a similar study of Indian corn. Two others who are now professors of agriculture spent considerable extra time in the study of forage grasses. Several others have studied grasses, two of whom made excellent exhibits at our State Fairs and one made a collection of grasses which went to New Orleans. Several have studied the smuts and rusts and moulds, including the cultivation of these minute plants.

Besides the regular class work in the forenoon, I venture to give you a brief account of what happened in one day at the time of writing this report. One student is poisoning dried plants before placing them in the herbarium; another is fastening these to sheets of paper, together with their labels; another is shelling out and putting away samples of dried seeds of weeds for comparison in case samples are sent here for identification; one is working on the history and structure of the Egyptian lotus from our botanic garden; another studies some old potato sprouts which have formed small tubers; another comes in by request of the professor of horticulture to study the structure of asparagus; another, who is an editor of a widely circulating horticultural magazine, is working on the structure of the asters, and other difficult plants which he is likely to have sent him for identification; another resident graduate from Japan is studying the smuts and rusts which infest our wild and cultivated plants, and is just now delighted to find the spores are germinating on some of his young plants of wheat grown in the laboratory. At the same time, an expert is employed at my expense to make drawings of grasses and clovers for a proposed work on these subjects.

In brief, the botanical laboratory is more and more becoming a place for daily resort by special students and by those who wish to look up something for some other class, or for an exercise in our popular Natural History Society.

THE MUSEUM OF VEGETABLE PRODUCTS.

This occupies the rooms over the laboratory and study. Much of my time during the past year has been devoted to collecting, preparing, and arranging specimens in this museum. Unless one has done some of this kind of work, he could little understand the great amount of time which is required to make a museum. Most of the specimens must be found and brought here, as they are not in the market. It is my plan to arrange most of the specimens in natural orders, though there will be some exceptions to this rule. The samples of timber sent to Philadelphia in 1876, and to New Orleans in 1884, have been polished, relabeled, and with many additions have been placed on exhibition.

The forest products so far placed on exhibition, occupy the cases and other space about 16x54 feet. At the left on entering the door are some 14 samples of natural grafts as they appear above ground, and samples of many more as they appear below ground. There are two logs grown over deer's antlers, two trees containing nests of wood-peckers, quite a number of slabs of our leading sorts of trees, samples of 13 sorts of posts formerly buried to show that it makes no difference which end up they are set in the ground; there are small trees

eight or ten years old from the arborteum, sections of logs of several kinds showing how they check at the ends as exposed in the mill yard, cuts showing much sap-wood, much heart-wood, or the heart one side the center, a number of trees injured by vines, one grape vine over one hundred feet long; several trunks which are very winding, samples of many kinds of knots cut and polished, some tough boards from second growth trees, some showing defects caused by dead limbs which remained on the tree. There are polished boards of our native and cultivated trees and shrubs in great variety, a collection of barks, of peat, of pressed wood to imitate carving, very thin sections of seventeen species of woods suitable for the school room to use as illustrations; truncions and cross-sections of our native woods; samples damaged in various ways by insects; black ash, buttonwood, and white pine separating into layers; pieces of trees damaged by lightning, by mice, by squirrels, by birds, and by horses, where the owner failed to provide a hitching post; a very good collection of nuts and cones, and cotton; quite a collection of the cereals, such as wheat in various conditions and from several countries; twenty-seven sorts of sorghum, rice in the bundle as grown at the south, hybrids between wheat and rye, 90 species of grasses in bunches, roots taken from tiles which had been obstructed, samples of labels and plates as used by various horticultural societies; a typical set of fossil plants; a case devoted to Indian corn classified as dent, flint, tuscarora, sweet, pop, and "husk" or "poded" corn. Among the most interesting of these are samples grown from the "earliest" times by Indians in Florida, in Dakota, in Canada; corn in various stages of manufacture, corn with a different even number of rows from four to thirty-six, ears with the rows running spirally, ears without evidence of rows, corn which has been crossed, ears of many colors, and ears each one of which shows more than one color of corn, ears doubled at the end, corn inside the cob, ears which taper very much, ears defective, ears with much silk, ears where every kernel is covered by a husk of its own, a stalk containing seven ears, one 15½ feet high with the tip of the ear nearly 12 feet from the ground. This collection of Indian corn is thought to be very complete for this country.

In one case is a beginning of a typical collection of mosses, liverworts, lichens, fungi, ferns, rushes, etc., so arranged that a visitor may get a little notion of these orders of plants.

In future, it is the intention to keep the museum open every day. Visitors who wish to receive much benefit from the specimens should take time to read the labels.

THE HERBARIUM.

For a year past, I have given more attention to the herbarium than ever before. While I did the work of a Professor of Horticulture, no time could be spared for this work. An herbarium is as necessary for the student of botany as a Shorthorn herd book is to the breeder of one of the leading kinds of cattle. We have been mounting the addition of 2,500 species of European plants sent us from Harvard University. To the "outsider" any amount of work may be placed on an herbarium without making any show.

THE BOTANIC GARDEN.

Th s has run along about as usual with some improvements by way of adding plants and adding some earth in low places.

As is well known by those who have recently been at the Agricultural College,

the botanic garden is situated on the east side of the brook which runs between the green-house and the botanical laboratory. A rustic foot bridge enables people to pass from one high bank to the other. Boulders, large and small, have been freely used about the slopes and the different orders of plants, and for steps or seats on the shady bank or near the water. The garden is divided into 41 wards, each of which contains plants of one or more natural orders. There is a printed guide with a map to the garden, given as part of a former report. These are given to my students to help in their studies of botany. During the past year, three numbers of the *College Speculum* contained somewhat lengthy articles in regard to the botanic garden. From this place I took a dozen or more interesting aquatics to the American Association for the Advancement of Science, held in Ann Arbor. The garden requires considerable attention to keep the plants and labels in their proper places, and to replenish the vacancies which are always to be found. No attempt is made to keep everything in the style of a flower garden on a fine lawn, yet it is common to hear the remark from visitors, "This suits me the best of any place at the college."

Here the florist finds much to admire, the artist picks out the views which suit him best, and no doubt poets and lovers find this a pleasant resort, while the pleasure seeker thinks it worth looking over. The farmer's wife thinks "it is nice," while the husband takes notes with a determination to fix up that rough piece of his back of the house. The young girl thinks "it cute," while the students of entomology and botany think it a little paradise.

THE ARBORETUM.

This contains a little less than two acres and is situated between the houses of Dr. Kedzie, the secretary, and the highway at the north. It was begun ten years ago and now presents many things of interest to the botanist, horticulturalist or any one who has an eye to the beauties of nature. It now contains about two hundred species of trees and shrubs, nearly all of which are labeled. Quite a number have fruited, some of them more than once. Of those fruiting, I may mention white ash, basswood, catalpa, sugar maple, ash-leaved maple, red elm, silver maple, mountain maple, chestnut, chinquapin, white birch, canoe birch, Hercules club, butternut, European larch, choke cherry, service berry, hop tree, alder, European apple about as large as a pea, probably the parent of our Siberian crab, and three or four others an inch in diameter, the parents of our cultivated apples. At this time a detailed account of the arboretum would seem to be out of place.

DONATIONS.

The donations have been as follows:

Prof. James Satterlee, Lansing, Mich.:
One knarl from a chestnut tree.

The heirs of F. S. Sleeper, Class of '68, Galesburg, Mich:
Seventy-five dry herbaceous plants.

J. W. Higbee, Class of '74, Colfax, Washington:
Samples of wheat, oats, and barley.

Prof. Edgar Grimm, Class of '73, Corvallis, Oregon:
Four samples wheat.

Fred Schumacher, Akron, Ohio:
One package corn, oats and barley chop.

One package barley chop.
One package gram. wheat meal.
One package oat flour.
One package cracked wheat.
One package gram. yellow corn meal.
One package barley meal.
One package rye flour.
One package barley flour.
One package white corn flour.
One package rye shorts.
One package bolted yellow corn meal.
One package rolled wheat.
One package oat bran.
One package oat dust.
One package oat shorts.
One package Avena A. & B. oatmeal.
One package hulled oats.
One package pearl wheat.
One package rolled wheat.
One package wheat.
One package barley.
One package pearl barley.
One package cracked barley.
One package farina.
One package hominy.
One package yellow cracked corn.
One package gram.
One package corn meal.
One package white corn farina.
One package samp.

Hon. T. T. Lyon, South Haven, Mich.:
One cocoanut in shuck.
Fossil wood from Arizona.

Frank Wells, Lansing, Mich.:
Three reed fish poles, *Arundinaria tecta.*

Thomas Foster, Lansing, Mich.:
One beech natural graft.

Miss May Chapman, Bangor, Mich.:
One orchis.

MISCELLANEOUS WORK.

The number and variety of questions asked is on the increase, requiring a good deal of time for replies.

After serving as secretary of the American Pomological Society for four years and editing two reports, I positively declined to serve for a third term. The last meeting was held at Grand Rapids. It was well attended and considered by many good judges to be the best meeting of the kind ever held in America.

Several invitations to lecture, including some from other States, were declined. I attended the usual number of farmers' institutes.

In accordance with a new act of the Legislature, I prepared one bulletin which was, "*Testing the Vitality of Seeds buried in the Soil.*" This was

largely quoted by the agricultural press of this country and by at least one journal in England.

Owing to the amount of work required in the museum and on the herbarium, with the care of the arboretum, botanic garden and classes, I have been unable to make many experiments, though I have seen much that I should like to undertake College work prevented me from taking any part in the recent meeting of the American Association for the Advancement of Science, held at Ann Arbor. I was also, for the same reason, unable to present a very worthy paper at the meeting of the Society for the Promotion of Agricultural Science, held at Ann Arbor.

In undertaking a large number of experiments during the time I was professor of botany and horticulture, I often attempted more than could be satisfactorily completed. A lack of means also sometimes made it necessary to drop some experiments before completion. To properly complete some that were begun would require years of repetition before reliable results could be obtained.

As I am now no longer professor of horticulture, but professor of botany and forestry, it has seemed to me that all the time at my disposal could profitably be given the study of grasses and the diseases of plants, or the low forms of plants injurious to vegetation. A study of the latter is close, hard work, which has been too much neglected, but is likely soon to assume the prominence attained by economic entomology.

To one who has made many experiments, and seen a little how difficult it is to arrive at correct conclusions, and how slow the people are to give due credit for the same, the encouragement for work in this direction is not very great, especially when the time and means are limited.

In closing, I cannot help telling you how much I appreciate the great interest and cordial support in word and actions you have given the Botanical Department. It does one good to see your enthusiasm spreading through all the work of the college from the faculty and students to the humblest employé. It certainly bespeaks a rapid growth and greater efficiency of the Michigan Agricultural College.

Cordially your friend,

W. J. BEAL,

Prof. of Botany and Forestry.

AGRICULTURAL COLLEGE, Sept. 29, 1885.

REPORT OF THE DEPARTMENT OF MATHEMATICS AND ENGINEERING.

To President Edwin Willits:

DEAR SIR:—I have pleasure in submitting to you the following Report of the Department of Mathematics and Engineering for the year ending September 30, 1885.

CLASS WORK.

My assistant, L. G. Carpenter, whose report is appended, taught classes in algebra, geometry and drawing, astronomy for the fall term of 1884, having on the average three and one-half classes each day. I taught classes in agricultural engineering, civil engineering, surveying, trigonometry, algebra, mechanics, astronomy and drawing, making an average of two and one-half classes each day.

The topics taught in each class are, I think, fully indicated in the catalogue. The following in tabulated form will probably confer any information desired respecting the class work:

TABLE.

Study.	Class.	Number.			Remarks.
		Enrolled.	Passed.	Failed.	
Civil Engineering	Senior	16	16	0	Elective—Spring Term.
Agricultural Engineering	Senior and Junior	28	28	0	Elective—Fall Term, 1884.
Agricultural Engineering	Senior	9	8	1	Elective—Fall Term, 1885. Same hour with Psychology.
Astronomy	Senior	24	24	0	Elective—Summer Term.
Mechanics	Sophomore	36	32	4	Required—Summer Term.
Surveying	Sophomore	36	32	2	Required—Spring Term.
Trigonometry	Sophomore	36	32	4	Required—Spring Term.
Algebra	Freshman	16	10	6	Required—Fall Term, 1884.
Drawing (Mechanical)	Freshman	29	....	....	Mechanical Students.

In addition to the class work I have attended to the following college duties: I have superintended and designed repairs to the steam works, pumps, engines and machinery. Since September 1st I have had supervision of the work of college carpenter. I also prepared drawings and specifications for the new mechanical building and I have had charge of the shop work of the students in the mechanical department. A separate report of the repairs in brick, iron and wood, and of the improvements needed, will be submitted.

COURSE IN MECHANIC ARTS AND ENGINEERING.

In this course I have charge of the shop work and drawing, both of which pertain to the province of engineering.

Our building for shops not being completed it became impossible to carry out the systematic shop work which had been planned. At one time it was questioned whether any shop instruction better be attempted until the new shop was completed, it was finally decided, however, to give all the shop instruction possible in our existing buildings. Accordingly benches were fitted in all available parts of the boiler house, forges were erected near the boilers, and such money as could be afforded was invested in tools for iron and wood working. Room for six students to work in wood was found in the old brick carpenter shop. Places were found for twenty-five students, or for nearly all entering that course.

Subsequent events proved the wisdom of the latter course, for more has been accomplished than the most sanguine expected.

Our policy of managing the shops is to keep the labor, so far as it possibly can be made educational, employed on objects of utility. No wages are paid for this labor, but a time account is kept against each piece of work. The students have been very enthusiastic in the work. In the wood shop, the young men acquired considerable skill in the use of the saw, plane, square, hammer, and in making glue joints, while at the same time the work has been

wholly given to useful articles. Students have constructed packing boxes, bench work, tool cases and patterns for foundry work.

Mr. H. B. Mohn has had charge of the wood working, and, considering the disadvantages of having a bad room, poor benches and no power, has done exceedingly well.

In the iron shops we were somewhat better equipped, as we had one good room in the boiler-house into which we could put our machinery. The room has been very much crowded, but still it has answered very nicely. In the room, 23x38 feet, we had the following machines:

One 18-inch lathe, F. S. Perkins, Lowell, Mass.

One 12-horse-power engine, Olds & Son, Lansing.

Two 10-inch lathes, F. E. Reed, Worcester, Mass.

One 8-inch shaper, Boynton & Plummer, Boston.

One 8-inch lathe, Sheperd, Cincinnati, Ohio.

One 10-inch lathe, Warner & Swasey, Cleveland.

One planer 24 inch by 24 inch by 8 feet, G. A. Gray, Jr. & Co., Cincinnati.

One 20-inch drill press, F. E. Reed, Worcester, Mass.

One gig-saw, our own make, and benches for eight students.

The iron work has been in charge of Mr. James Wiseman, our engineer. He has proved himself very competent as a workman and an instructor. The students have been at work principally on two turret lathes of which the castings were obtained of the Frontier Iron and Brass Works, Detroit. We did not get at work on these until about September 28, so at this date but little has been done. We hope, however, to have one lathe ready for work in the spring term 1886. The students have evinced great enthusiasm for this work and we have had little or nothing to complain of on the score of carelessness or neglect.

The amount available for equipment of the shops is only about $2,300, and until more money can be obtained we shall labor under great disadvantages so far as machinery is concerned. Had it not been for the machinery previously bought, very little could have been done with the large class already admitted to the college. As it is we can afford instruction only as follows: hand wood working 8, lathe work in wood 2, blacksmith work 8, bench work in iron 10, machine work in iron 8, or a total of 36 students.

With proper plant we could in time complete our own equipment, but in the meanwhile we are likely to suffer by not having tools enough for the students.

We are already at work on two 15-inch lathes; when these are completed we propose to construct a small engine and engine-lathe. These will help our equipment materially.

In all our dealings with the manufacturers we have found them very liberal and willing to give great concessions for the sake of aiding the college and of introducing their tools. We invariably obtained large discounts, and many drawings have been donated.

Mr. B. F. Sturtevant, of Boston, Mass., very liberally donated to the college a 24-inch pressure blower and eight blast gates, to be used in the blacksmith shops. This is a very liberal donation indeed, and considering the number of tools needed and the small amount of our available fund is very acceptable.

Prof. Louis McLouth, who has the general oversight of the education matters pertaining to the mechanical department, will no doubt report fully in regard to further resources and needs of the Department.

I am, sir, respectfully yours,

R. C. CARPENTER,

Prof. of Mathematics and Civil Engineering.

AGRICULTURAL COLLEGE, September 30, 1885.

REPORT OF THE PROFESSOR OF VETERINARY SCIENCE.

To the President:

SIR:—I beg to submit the following report of work done in the Veterinary Department for the year 1884–5.

In September 1884, the second course of veterinary science commenced at this college. The class consisted of 26 students.

The autumn term was devoted, as on a previous occasion, to instruction in veterinary anatomy: the horse being taken as the standard, and comparisons were made from it of the ox, sheep, and hog, when with the aid of skeletons, and other equipments lent me by several departments of the college I was able to illustrate many of my lectures, in I trust, a satisfactory manner. Towards the close of this term the students purchased a horse, which enabled us to do some practical work in anatomy; this I felt proved a great aid in impressing on their minds, the situation, structure, and relations of many parts, which it would be difficult to do without an actual subject, and although the class and myself labored under much difficulty, as we were without a proper dissecting room to do our work in, yet I feel that we were richly repaid for any trouble we went to. While doing this work I divided the class into two divisions; No. 1 working the first part of the afternoon, and No. 2 the second part; by this arrangement the other duties of the students were not interfered with, and I was not inconvenienced by too many persons being around the cadaver at one time. Before the animal was killed it was put under the influence of chloroform, which enabled me to show the class some of the ordinary operations of veterinary surgery in a practical and humane manner.

SPRING TERM, 1885.

During this term my class was composed of 28 Seniors and one special; my work consisted in giving daily lectures upon the diseases which affect the external surface of the body of the domestic animals, as well as one weekly lecture upon materia medica, in which I described the actions, uses, doses, and many other matters relative to the handling of drugs. I also gave several lectures upon the external conformation of the horse, as well as the manner of examining an animal for soundness prior to purchase. In pursuing this study I first of all went over the many points in the lecture room, having a life sized diagram to illustrate my remarks, after which I borrowed a few horses and went through the operation in a practical manner, discussing, as we went along, the good and bad points of the animals before us.

DURING THE SUMMER TERM

my class consisted of 25 students, and my work consisted in giving lectures upon the internal diseases of the domestic animals; I also continued my lectures upon materia medica. It may be worthy of special mention, that during this term I gave a number of lectures upon veterinary obstetrics which I illustrated with large diagrams and described many difficulties in parturition, pointing out the important features to be observed in labored cases of calving, lambing, foaling, etc., which I consider very important subjects to those engaged in stock raising.

I illustrated other lectures in this course with actual cases of disease when it was possible for me to do so.

OUTSIDE WORK.

During the autumn of '84 I delivered addresses upon subjects relating to live stock before the Shorthorn and Holstein associations of this State. In the winter I lectured at three Farmers' Institutes, and in my turn I delivered the Wednesday afternoon lecture at the college. I also attended to the veterinary requirements of the animals in the horticultural and agricultural departments, of this institution.

I prepared and issued a bulletin, as required by an act of the Legislature recently adjourned. In July of this year I was appointed State Veterinarian by the Governor of the State, since which time I have attended to the several matters required in that office.

I wish to add that the very liberal appropriation given to the Veterinary Department by the Legislature of 1885 will enable me to conduct my various exercises at the college with, I trust, very much greater benefit to those students who may elect this study as part of their college course, as the building now in course of erection will be equipped with models, instruments, dissecting and operating rooms, and other materials, with which I can readily illustrate my lectures much better than I have ever been able to do in the past.

Very respectfully submitted.

E. A. A. GRANGE,

Professor of Veterinary Science.

AGRICULTURAL COLLEGE, Sept. 1, 1885.

REPORT OF THE PROFESSOR OF ENGLISH LANGUAGE AND LITERATURE.

To the President:

I have the honor of submitting the following brief report of my work for the year 1884–5:

A year ago, a change was made in the English course owing to the evident necessity, that our Freshmen should be equipped with a better knowledge of English before beginning the study of rhetoric; and it was my duty to give the class then entering, instruction in such topics as should most fully prepare them for subsequent work. The Freshmen, with a few specials, made a class of fifty-eight, and were taught in two divisions. Whitney's *Essentials of English* was used as a text-book. Beginning with the structure of the simple sentence, the class was led step by step through all the varieties of English construction, being required not only to explain the examples furnished in the text-book, but to bring in for discussion those of interest, found in their general reading. Then the general principles of etymology were taken up, with reference to derivation and composition. The verb, with its peculiarities of formation, was given special attention. A little book of Shakespearean selections in Clark and Maynard's English classic series, furnished the text for analysis and parsing, the last month of the term. The wisdom of the change in the course was fully vindicated when the class took up rhetoric in the summer term.

My other work during the full term, was elocution with the Freshmen, Shakespeare readings with Juniors, and English literature with the Seniors. The freshmen met in sections six times a week, for voice culture, drill in position,

action and gesture, and the declamation of selections from American orators. This class numbered fifty-six, and each student presented three exercises. The Juniors met Thursday afternoons for reading Shakespeare, the play selected being Julius Cæsar. The Seniors meet Wednesdays, for the reading of critical essays on the productions of contemporary English poets, Browning, Mrs. Browning, Tennyson and Matthew Arnold, furnishing most of the matter studied. Besides these essays, others were presented, on the lives, and characters, of the authors, and their relations to contemporary literature. General discussions were had on the subjects presented, and the written work was left with myself for correction. The class numbered thirty-three.

During the spring term, I gave instruction to the Sophomores, meeting in two divisions, in advanced rhetoric, taking *A. S. Hill's Principles* as a guide. The philosophy of style, and the fundamental principles of narration, description, conviction and persuasion, were the subjects of study. The text-book work was supplemented by lectures, and the exposition of illustrative passages from classic English authors, the study of Burke's speech on "Conciliation with America," and essays applying the principles discussed. The class met on Tuesday afternoons during the term for the study of Burke. Each of the thirty students was required to present, before the class, three essays, one descriptive, one narrative, and one argumentative. During this term, the work in elocution was carried forward with the Freshmen, the class numbering fifty-six, meeting in two sections on Saturday mornings, having the same drill as the previous term, and each student presenting four declamations. The English literature was dropped, the Seniors having essays on historical subjects with Professor Harrower. The Juniors met for Shakespeare readings, the same as the previous term, selecting Othello as the play to be studied.

My work during the summer term was, English literature with the Juniors, readings in Milton with the Seniors, and the direction of the exercises of commencement week. After six preliminary lectures, the Juniors took up the study of English literature, using *Shaw's New Manual*, with *Chambers's Cyclopedia of English Literature*, for illustrative readings. Each student presented before the class, three critical essays, following an outline previously suggested, the entire class having previously read the selection criticised, so as to discuss intelligently the merits of the essayist's criticisms. The class numbered thirty-four. The Seniors met Wednesdays during the term for a study of Milton's "Paradise Lost." The first four books were read with such comment and exposition as seemed desirable. The Shakespeare readings were continued with the Juniors, Thursday afternoons. During this term as during the entire year, the Seniors and Juniors met every other Wednesday afternoon to deliver before the students, and such other persons as might attend, original speeches, on subjects suggested by myself or chosen by them. While this is a valuable exercise, bringing a discipline and culture obtained in no other way, it involves on the part both of student and instructor a large amount of work. To select so great a number of suitable topics, neither inappropriate nor hackneyed, to secure from the library, observation or reflection, the proper material to plan so as to present in the brief times allowed, only the strongest points, to express the thought so as to secure brevity, yet not sacrifice the oratorical swing of the sentence; to secure proficiency in delivery by repeated rehearsals,—requires an amount of time and effort, not to be appreciated by any save those who have directed such work. There have been delivered, during the year, one hundred and twenty-two of these original speeches. It was my duty to supervise all the public exercises of commencement. Besides the suggestion, and correction of literary

work, and drill of classday and commencement speakers, the erection and seating of the large tent used on that occasion, involved some time and much anxiety and effort.

The success of the occasion, however, was ample compensation. I have delivered two of the regular Wednesday afternoon lectures in the chapel, one on "Milton's Personal Character" and one on "The Growth of the English Novel;" and I have attended the Farmers' Institutes, as appointed by the Board of Agriculture, lecturing on "Public Speaking."

The work of the English Department has been seriously affected by the loss of Professor Harrower, who for four years relieved me from what, for one man is a great burden of literary exercises. The need of additional help in this work, as well as of better equipments for this Department, is too well known to yourself, to make any discussion of the subject here necessary.

Respectfully submitted.

E. J. MACEWAN,

Professor of English Language and Literature.

AGRICULTURAL COLLEGE,
October 1, 1885.

REPORT OF LIBRARIAN.

To the President:

The winter vacation of 1884–5 was spent at the library of the University of Michigan, where Professor Davis and his assistants gave me every opportunity for learning the best methods of library work as well as access to the book rooms and seminary rooms at all times; a considerable amount of subject cataloguing was done there under the supervision of Professor Davis and with the assistant librarian, Miss Farrand.

The work of the library, care of the mail, and attendance on visitors has been done with but little assistance and has required all the time; the subject catalogue has been doubled in size and the author's catalogue thoroughly revised; eleven large lamps have been hung in the alcoves which, by that means, are comfortably lighted for reading; new chairs have also been added.

The book department has had added, by binding, 282 volumes; by gift, 200 bound volumes and 200 pamphlets; by purchase, 336 volumes, making the total number of bound volumes 7474 without duplicates, and 1212 pamphlets, or 8686 books and pamphlets together. The following persons have kindly assisted in completing our collections, viz:

H. R. Gass—Reports of Supt. of Public Instruction, 1878–1882.
Secretary of War—Official Records War of Rebellion, six vols.
Dr. Henry B. Baker—Report State Board of Health, 1883.
John Eaton—Report Commissioner of Education, 1882–3.
Hon. T. Robitaille—Journals Legislative Assembly, Quebec.
Commissioner of Railroads—Report of same, 1880–'81,–'82–'83–'84.
Secretary of State—Five volumes Farm Statistics, Michigan.
Dr. T. C. Abbot—Kentucky Agricultural Report, 1879.
Dr. T. C. Abbot—College Documents, 23 vols.
Dr. T. C. Abbot—Ohio Journal Education, 2 vols.

Dr. T. C. Abbot—*Michigan Journal Education*, 1 vol.

Dr. T. C. Abbot—Nebraska Agricultural Report, 1870, and a large number of other reports.

Hon. O. L. Spaulding—Tenth Census of United States, 4 vols. of same.

Hon. J. E. Hilgard—Coast and Geodetic Survey, 1883.

Hon. H. W. Cannon—Annual Report Comptroller Currency.

Hon. H. M. Teller—Senate and House Journals.

Hon. Edward Orton—Geological Survey of Ohio, vol. 5.

Department of State—Commercial Relations, 2 vols.

Mrs. H. A. Tenney—Michigan Reports, vols. 51, 52.

W B. Hazen—Report Chief Signal Officer.

D. E. Salmon—Vol. I., Report Bureau Animal Industry.

G. B. Loring—Report Department of Agriculture, 1884.

Department of War—Report of Chief of Engineers, vol. 4.

Hon. J. M. Gregory—I. and II. Reports Civil Service Commission.

Hon. C. V. R. Pond—Report Bureau of Labor Statistics.

Wm. Sims—Report State Board of Agriculture, Kansas.

T. T. Lyon—Report Missouri State Horticultural Society.

T. S. Gold—Report Connecticut Board of Agriculture, 1884.

Wesley Emery—Temperance Physiology. (Hunt.)

W. J. Beal—New Hampshire Agricultural Report, vol. 13.

Fish Commission—Reports Commission, 1880-'81-'82.

Lieut. Lockwood—United States Army Regulations.

L. G. Carpenter—History of Berea College

Prof. S. M. Tracy—Mo. Agricultural Reports, 1866, 1867, 1878, 1879.

War Department—American Ephemeris and Nautical Almanac.

Smithsonian Institute—Report Smithsonian Institute, 1883. Contributions to Knowledge, vols. 24–25.

President Willits—Life and Character of James A. Garfield.

H. A. Conant—Michigan Manual, 1885.

Department of State—Consular Reports, 3 vols.

Department of Navy—Eclipse of Sun, 1869.

Department of Navy—Astronomical and Meteorological Obs , 1881.

C. W. Dabney—North Carolina Exp. Station, 1884.

F. W. Cragin—Vols. 8–9 Trans. Acad. Science, 1881–1884.

T. J. Burrill—Illinois Industrial Report.

The following pamphlets have been presented by the persons named or are from the departments at Washington:

Department of State—Consular Reports, Nos. 42–3–4–5–6–7–8–9, 50.

Experiment Station Reports—Mass., Penna., Bussey Institution, Conn., Miss., Colorado, Cal., Manitoba. Tenn., Wis., Ohio, Paris, Madras and others.

Crop Reports—Ohio, Ga., Tenn., Ky., Mass.

College Catalogues—42.

Witter J. Baxter—Annual Report State Board Corrections and Charities, 1884. Proc. 10 and 11 Annual Nat. Confs. Charities and Corrections.

N. S. Whitney—Ninth Annual Report Montreal Horticultural Society.

G. B. Loring—Agricultural Grasses of U. S.

Estate of F. S. Sleeper—Six volumes Scribner's Magazine; two volumes American Agriculturist; Naturalist's Directory, 1878; eighteen pamphlets on Entomological Subjects.

S. M. Clark—Commencement Address, Iowa College.

Navy department—Report of Superintendent of Astronomical Papers.

Prof. and Mrs. C. Georgeson—*Rapport sur l'extraction du sucre de sorgho sucré aux États Unis en 1884.*

Prof N. H. Winchell—Geological Report 11 of Minnesota.

Mrs Harriet A. Tenney—United States Statutes, 1883–4, and 1884–5.

Bureau of Education—Five educational pamphlets.

Wm Brown—Application of Scientific and Practical Arboriculture to Canada

Treasury Department—Reports Bureau of Statistics.

War Department—Signal Service Papers. Report Lt Gen. of Army, 1884.

Agricultural Department—Sugar Industry of U. S , Agricultural Grasses and other papers.

Robert Manning—Reports and papers of Mass Horticultural Society.

J. N. Foster—Biennial Report State Public School for Dependent Children.

J. D Frederiksen—Creaming Milk by Centrifugal Force.

E. F. Webster—Report Department of Revenue, Settlement and Agriculture, Madras.

C. B. Collingwood—Minutes Twenty-sixth Annual Convention Delta Tau Delta Fraternity.

Essex Institute—Bulletins of same.

Seed catalogues and implement dealers' trade lists—H. S. Hampton, Idaho.

Eusèbe Senécal & Fils—Le Journal d'Agriculture illustré.

L. G. Carpenter—Monthly Weather Review and Signal Service Notes, No. 13.

Dr. Henry B. Baker—Papers from State Board of Health office

J. Thorburn—List of Geological publications of Canada and publications.

Institute Lombards—Vols. 15–16 Scientific Collections.

Prof. S. H. Johnson—Scales of points of cattle and other papers.

French Minister of Agriculture—Documents officials, statistique.

J. W. Wadsworth—Report N. Y. State Agricultural Society.

J T. Henderson—Analysis comm. fertilizers and other papers.

Wm. Saunders—Agricultural graphics and other papers.

Ameri an Museum of Natural History—Annual Report

Wm Sims—Kansas.

C. A. Wetmore—State Viticultural Comm. Reports California.

Prof. L. H. Bailey—Treatise on Dutch Bulbs Catalogue N. American Carices and Supplement Botanical Gazette, vol. 9.

Franklin Institute—Fiftieth Anniversary. Official Catalogue International Electrical Exhibit. Report Twenty-seventh Exhibit Am. Manufactures.

J. W. Sanborn—*Missouri Agricultural Reports, Nos.* 13, 15, 16, 17.

Jas. Mills—Report Ontario Agricultural College

Prof. C. W. Scott—Agricultural Education.

H. S. Evans—Montreal Horticultural Society Report.

Sanford Fleming—Proc. Canadian Institute.

A. A. Crozier—Modification of plants by climate.

E. B. Reed—Fifteenth Annual Report Entomological Society, Ontario.

Dr. T. C. Abbot—Experimental wheat growing and fifty other pamphlets.

Informe comision para la destruction de la Langosta, Public Instruction, Madras.

Our reports were sent to sixty experimental stations and colleges in the old world and in South America and Mexico, and we have had some matter sent us in return; the exchange will be kept up the coming year.

The newspapers and periodicals taken are as follows, viz:

FOREIGN.

Annales deChimie et de Physique.
Art Journal.
Agricultural Gazette.
Chemical News.
Engineering.
Garden.
Gardener's Chronicle.
Knowledge.
Nature.
North British Agriculturist.
Journal of Anatomy.
Journal of Chemical Society.
Journal of Forestry.
Journal of Royal Agricultural Society.
Journal of Science
Sotheran's Price Current of Books.
Veterinarian.
Veterinary Journal.

AMERICAN.

American Agriculturalist
American Bee Journal.
American Architect and Building News.
American Chemical Journal.
American Cultivator.
American Journal of Science.
American Journal of Comparative Medicine and Surgery.
American Library Journal.
American Microscopical Journal.
American Naturalist.
American Veterinary Review.
Andover Review.
Army Journal.
Atlantic Monthly.
Banker's Magazine.
Blackwood's Magazine.
Westminster Review.
Edinburgh Review.
British Quarterly Review.
London Quarterly Review.
Fortnightly Review.
Nineteenth Century.
Contemporary Review.
Boston Journal of Chemistry.
Botanical Gazette.
Breeder's Gazette.
Canadian Entomologist.
Century Magazine.
Chicago Tribune (Daily).
Christian Union.
Country Gentleman.
Critic.
Detroit Free Press.
Detroit Post.
Dial.
Education.
Electrical World.
Engineering News.
Entomologica Americana.
Gardener's Monthly.
Harper's Weekly.
Harper's Monthly.
Industrial America.
Iowa Homestead.
Journal Franklin Institute.
Literary World.
Littell's Living Age.
McMillan's Magazine.
Magazine of American History.
Manufacturer and Builder.
Mathematical Magazine.
Michigan Farmer.
Microscope.
Mirror and Farmer.
National Live Stock.
New England Homestead.
New York Independent.
New York Tribune.
New York Nation.
North American Review.
Ohio Farmer.
Popular Science Monthly.
Poultry World.
Prairie Farmer.
Rural New Yorker.
Science Observer.
Sanitary News.
Sanitary Engineering.
Science.
Scientific American.
Scientific American Supplement.
Southern Cultivator.
Wallace's Monthly.
Van Nostrand's Magazine.
Vick's Monthly.

American periodicals donated by the publisher, or by individuals:

American Bee Keepers' Magazine.
" Missionary Magazine.
" Rural Home.
Adrian Weekly Times.
Advance.
American Farmer.
Appleton's Literary Bulletin.
Battle Creek Journal.
Bee and Poultry Magazine.
Cincinnati Grange Bulletin.
Charlotte Republican.
Charlevoix Journal.
Christian Register.
Clinton Independent.
Coldwater Republican.
City and Country.
Deaf Mute Mirror.
Farmers' Advocate.
Farm and Fireside.
Farmers' Bulletin.
Farm, Herd and Home.
Flint Globe.
Grand Rapids Times.
Grand Haven Herald.
Grand Traverse Herald.
Grange Visitor.
Hillsdale Standard.
Hillsdale Leader.
Imports and Exports of U. S.
Industrialist.
Ingham County News.
Ionia Sentinel.
Kalamazoo Telegraph.
Lansing Journal.
" Republican.
" Sentinel.
Midland Republican.
" Sun.
Moderator.
Monroe Commercial.
Naturalists' Bulletin.
Official Gazette.
Our Young People.
Owosso Times.
Practical Farmer.
Romeo Observer.
Saginaw Morning Herald.
Scientific Roll.
Southern Live Stock Journal.
Sorghum Growers' Guide.
St. Louis Leader.
Union Signal.
Three Rivers Tribune.
Sentinel.
Ouray Times.
Traverse Bay Eagle.
Weekly Globe and Canada Farmer.
Wolverine Citizen.
Paw Paw True Northerner.
Watchman.
Locomotive.
Garden.
New England Farmer.

We have also received a few copies of several other of our county papers, all of which we are very glad to have, as some one will be sure to want them during the year.

Library hours have been lengthened to fifty-six hours a week, for students, and during late fall and early spring, when regular work is not furnished, the library is open seventy hours a week to all.

Eleven new large lamps have been hung in the alcoves, a number of chairs added, and nettings hung at the doors and windows.

Excellent success has been had the past year in securing books by exchange, both from other States and from abroad; it will be necessary during the next two years to increase the shelf room of the library, either by adding shelves at the top of the present shelves, or at the front of the alcoves, or by placing a tier of shelves in the center of the room.

The librarian feels it a duty to call attention to the need of a work-room and store room; the library is growing quite rapidly and all accessions and accumulations must at present be handled in the sight and hearing of all readers and visitors.

There should also be hand-washing and closet accommodations, not now afforded to the library.

The above suggestions are respectfully submitted with this report.

M. J. C. MERRELL,
Librarian.

REPORT OF PROFESSOR OF MILITARY SCIENCE AND TACTICS.

President Michigan Agricultural College:

SIR:—I have the honor to render for your information, the following report of the condition of the Military Department at this college, for the year 1885. In obedience to orders from the War Department I reported for duty at the college in November, 1884. Prior to that time there had been no military organization whatever.

PRACTICAL INSTRUCTION.

At the close of the winter vacation, I began drilling a squad of Seniors daily, in the elements of Infantry tactics and a month later other squads were formed, the Seniors above mentioned, having by that time become sufficiently advanced to assist me as instructors. On May 1, upwards of ninety students having been voluntarily enrolled for military instruction, a cadet battalion of two companies was organized and daily company drills were substituted for squad drills. Military exercises have been continued without interruption during the college year. In August, the cadets had become sufficiently proficient in the manual of arms and in marching to make a highly creditable appearance in Lansing on the occasion of the Grant Memorial service During the summer dress parades were occasionally substituted for drills with satisfactory results. Target practice has been held on several Saturdays. The targets used being those owned by the State troops, which are situated in the Chandler marsh. It is hoped that by another year the college will have a target range of its own, thus obviating the disadvantage incident to using a range so remote as is the one used heretofore.

THEORETICAL INSTRUCTION.

As far as practicable, the officers of the cadet battalion have been taken from the Senior class. They have been required to recite to me three times a week in Upton's Infantry Tactics. The cadet officers have organized a military society, at which I preside. This meets once a week for the purpose of stimulating the interest in military matters at the college. At these meetings essays are presented on military subjects and military questions are discussed. On July 3, I delivered a public lecture in the chapel on the subject of Military Instruction at Colleges.

DISCIPLINE.

The general discipline of the college has not passed under my control. As a rule, the cadets, during their military exercises, have manifested a desire to acquit themselves in a creditable and soldierly manner. No punishments have been resorted to, except an occasional reprimand or temporary relegation to an

awkward squad. The degree of discipline maintained is largely dependent on the cadet officers. These are appointed by me, with the approval of the president of the college, and receive letters of appointment signed by both. It is my aim to select for these positions, students who not only are proficient at drill but who carry their soldierly bearing and gentlemanly conduct into all the affairs of daily life. Should the general discipline of the college pass under military control, I am confident that regularity and promptness in attendance at classes and a more orderly state of things in the dormitories would result.

UNIFORM.

The dark, navy-blue uniform adopted for the College Cadets is similar to that worn at the State Universities of Ohio and Wisconsin. It is neat, inexpensive and can be worn with propriety on all occasions.

RECOMMENDATIONS.

A legislative enactment conferring the brevet rank of second lieutenants on military graduates of the college is desirable. Such an act was passed in behalf of the graduates of the Orchard Lake Academy with beneficial results.

I recommend that Upton's Infantry Tactics be recognized as one of the Senior studies in the next annual college catalogue. A thorough knowledge of even elementary tactics requires time and study.

I recommend that no student shall be graduated, after 1886, who has not been subject to military drill and discipline for at least one year, and, to accomplish this result, I suggest that military drill be made compulsory for Freshmen and Sophomores. Under existing arrangements (many students dropping tactics at the end of every term) my task is too much like that of Sisyphos to be beneficial to any but beginners, or satisfactory to myself. I am obliged to go over the same rudimentary ground each term, and battalion drill is never reached.

CONCLUSION.

In conclusion, I have to thank the president of the college, his predecessor, and the State Board of Agriculture for the aid and encouragement they have given me in my efforts.

Very respectfully, your obedient servant,

J. A. LOCKWOOD,

Lieut. 17th U. S. Infantry, Professor of Military Science and Tactics.

MICH. AGRICULTURAL COLLEGE,
October, 1885.

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EXPERIMENTS WITH ENSILAGE,

MADE BY THE FARM DEPARTMENT OF THE MICHIGAN STATE AGRICULTURAL COLLEGE, 1881-2.

The following statements were printed in our report for 1881–2, but as our supply of that issue is exhausted, and frequent inquiries are made for this paper, it seemed best to reprint it this year:

At the last regular session of the Legislature an appropriation was made of one thousand dollars, "for the purpose of conducting experiments with ensilage, for the feeding of animals, the culture of amber cane and new varieties of grain and beet roots, by the farm department of the Agricultural College." The bill was not passed until quite late in the session, being approved June 11, 1881, so that we were somewhat hurried in the preliminary work of preparing the ground and building the silo. As a new grain barn, with high basement walls, was being erected on the farm, we decided to build the silo in one corner of this basement, with the thought that if the ensilage experiment was not satisfactory, the silo could be utilized as a root cellar. A space in the northeast corner was chosen for this purpose, and a wall made, eighteen inches thick, well laid with common field stone and strong mortar. Tiles were laid to carry off water, and the floor was then covered with small stones, bedded in cement, and then cemented, as well as the sides, until all was smooth, and supposed to be air and water tight. The inside measurement of the silo is 14x15 feet, and walls 8 feet high. There is a door four feet wide and six feet high from the silo into the basement, where the ensilage is taken out. Where circumstances will admit, I think the barn basement is the proper place for the silo. It is near the stables where it is to be used, and a door through which it may be taken out, directly to the animals, is more convenient than to lift the ensilage over the top of the wall. Silos can be built in almost any barn in this manner at much less expense than if built separately, as no extra expense for roof is incurred. When filling the silo, matched plank were fitted in the doorway to the basement, and the ensilage packed against these as the filling proceeded. When opened, the ensilage was found to be as perfectly preserved next to these plank as in any other part of the outside of the silo. Matched plank, two inches thick, were used as a cover, care being taken to have them fit closely, but not to bind in the settling.

The items of expense incurred in building the silo are as follows:

Excavation	$10 00
Fifty-six perch of stone, at 75 cents a perch	42 00
Laying stone, at 60 cents a perch	33 60
Ten barrels lime, at $1.10	11 00
Sand	3 40
Four barrels cement, at $1.45	5 80
Grouting bottom, cementing sides, etc	10 00
Doors and frames above	30 00
Plank for covering silo	6 00
	$151 80

CORN-FODDER GROWN FOR ENSILAGE.

The land upon which the fodder corn grew is a sandy loam—sand predominating. It had grown a corn crop the previous year, and was clean, but not sufficiently fertilized to produce a large crop. It was put in good condition to receive the seed, and drills marked three and one-half feet apart June 11th the plat of 1¼ acres was planted with the Hathaway dent corn—the variety grown upon the farm for some years. Corn was dropped in the drills and covered by hand, at the rate of one and one-half bushels to the acre. I think less seed would have given a larger yield, as it was too thick to make a large growth. The corn came up well and grew very rapidly, receiving three cultivations and being kept free from weeds. In August the severe drouth began to tell upon its growth—the leaves and some of the stalks turning yellow, occasioned by the dry weather and the crowded state of the plants. But few ears formed. I quote from our field notes: July 21st—The ensilage corn is rolling considerably. July 28th—The ensilage corn has been at a stand-still for a week, on account of the extreme dry weather. August 8th—The ensilage corn has been shortened a good deal by the dry weather. August 18th—Continued rains. The ensilage corn, though cut short, seems to be making some growth at present. August 26th—The ensilage corn is again nearly at a stand-still, owing to the dry weather. That the dry weather shortened the crop was plainly evident.

FILLING THE SILO.

We began cutting the corn and filling the silo on Monday, Sept. 13th. The most of the stalks were green and full of juice at this time. On some parts of the plot some stalks were browned and the lower leaves dried, but to no great extent. A two-horse tread-power and our ordinary stalk-cutter, made at Fulton, N. Y., were used. A one-horse cart, and a double team and wagon drew the corn to the silo, which was only a few rods distant. The work was mainly done by students, who only work three hours in the afternoon, and so no full day's work was performed. On Wednesday, the 15th, it rained, and the cut fodder was somewhat wet, and some corn was cut while the water was dripping from it. On Thursday, the 16th, we finished the cutting. The corn, cut in pieces about one-half inch in length, was run directly to the silo, where it was spread and tramped down as compactly as possible. Nothing was mixed with the fodder, and no other crop but corn was put in the silo. We cut at the rate of two tons an hour, I think, and we found the tread-power to answer a very good purpose. With a large machine more power would be needed, but twenty tons a day works it up quite as rapidly as most farmers will desire. Farmers

will, I think, find any good power cutter will do as well, perhaps, as some of the more recently patented machines known as ensilage cutters. The stalks were not weighed when put in, but we have weighed the ensilage as it was taken from the silo, and it weighed out 40,000 pounds in round numbers, or between ten and eleven tons to the acre. This yield is a very fair one, when the condition of the land and season are taken into account; but I have no doubt that it might be trebled, perhaps more, under the most favorable conditions.

COVERING THE SILO.

The ensilage having been carefully leveled, so that the pressure should be equal, the planks, two inches thick and eight inches wide, were nicely fitted as the covering proceeded, care being taken that there should be no danger of *binding at the ends, as the settling continued. It was then weighted immediately* with stones, at the rate of nine hundred pounds to the square yard.

Various means for securing the desired pressure for the ensilage have been suggested, but it seems quite probable that weights of stone, wood, bags of grain, or boxes of earth will be found after all most desirable, as such pressure is constant and needs no watching, while a screw-power neglected, or forgotten, will be quite likely to result in failure The labor of putting on the stones and taking them off is no great item in the account. The stones we used had to be drawn a short distance, and three boys with a one-horse cart weighted the *silo in four hours.*

COST OF RAISING CORN AND PUTTING SAME IN SILO.

Plowing and harrowing 1¼ acres	$3 00
Marking and planting	2 74
Three bushels seed, at $1 00	3 00
Cultivating three times	2 50
300 hours student labor, at 8 cents	24 00
37½ hours team labor, at 1 shilling	4 69
15 hours men's labor, at 1 shilling	1 88
	$41 81

This makes the entire cost of growing corn and placing in silo $2.09 per ton. This amount also includes the time of getting the horse-power from a neighboring farm and returning the same, and some allowance must be made for delays that were unavoidable in work with which none of us were familiar.

There was no outward sign of any change going on within the silo. Only a temporary roof was over it for some time, and on one or two occasions it was left in such shape as to receive some rain. On December 15th the silo was opened. The ensilage was found to be nicely preserved. There was no mould next to the plank or sides worth mentioning, and there has not been one per cent of waste.

The thorough exclusion of the air is the secret of its preservation. It matters but little what materials are used for the silo—lumber, stone, or merely pits—if the air is only excluded the fodder will be preserved. Many farmers at the institutes during the winter have inquired, "How do you get the ensilage from the silo?" and so I refer to it here. The stones were thrown back from

five of the plank next the basement door, the plank removed, and this section was cut down with a hay-knife and taken out with a four-tined fork and placed in baskets to be taken to the stable. After this section had been disposed of the process was repeated, only taking off the cover as needed (another advantage in weighting in this way). The process is similar to cutting down a hay-mow.

Not one of the least important considerations of ensilage is the fact that so large an amount of it can be packed in a comparatively small space. A cubic foot of ensilage from our silo will weigh 35 pounds. From 5 to 6 per cent of the live weight of the animal will be a daily ration, or from 50 to 75 pounds for an ordinary cow. It is thus an easy matter to compute the number of cubic feet necessary to contain the food for a certain number of animals. The silo at the college is 14x15 feet inside the walls and 8 feet high, containing 1,680 cubic feet. Allowing 40 pounds to the cubic foot, we have a capacity for almost 39 tons of ensilage, or enough to feed five cows for 200 days a daily ration of 60 pounds each. When we take into the account the large weights that can be packed in a small silo it seems that this promises to be the most economical method of providing shelter for fodder—no small item to farmers who are not well supplied with buildings.

The ensilage was slightly acid in taste, quite brown in color when first take from the silo, but after exposure to the air a short time, regained largely its fresh, green appearance. The cattle, from the start, with a few exceptions, ate it with avidity.

An analysis, made at the New Jersey Experimental Station by Prof. Neale, is herewith given:

Loss at 100° C.	82.27
Protein	1.63
Fat	.76
Fiber	4.72
Ash	1.94
Carbhydrates	8.68
	100.00

The analysis will be found, with several others, in the report of Prof. Cook, director of the New Jersey Experimental Station, to which I refer elsewhere.

FEEDING ENSILAGE.

Object of the Experiment.

The aim of the experiment was to determine the comparative value of ensilage, as a cattle food, for the production of milk, flesh and growth.

With this aim in view, the ensilage was fed in place of roots, and as a full or partial substitute for the dry, rough feeds. A reference to the accompanying table will show the different proportions and combinations in which the ensilage was fed.

ANIMALS CHOSEN FOR THE EXPERIMENT.

Four lots of cattle were selected from the college herd Dec. 1, 1881.

Lot I consisted of two milch cows, Ayrshire and Shorthorn, that had dropped first calves early in September of the same year.

Lot II was composed of two steers, Devon and Ayrshire, of nearly the same age and weight. The Devon was in rather better flesh than the other.

Lot III had two large, dry cows, Shorthorns, very nearly alike as to weight, time of calf, condition of health, and feeding qualities.

Lot IV was made up of three bull calves, all Shorthorns, which were very even as to weight, condition of flesh, and age.

PREVIOUS TREATMENT OF THE ANIMALS.

Owing to the late growth of grass and the mild fall weather, the cows and steers had been turned out to pasture during the day and stabled only at night. They had been fed dry cut cornstalks once and meal twice daily. The three bull calves had been kept in stalls for a month previous to the experiment, and had received a good hay and meal ration.

During the month of November all the animals selected for the experiment had lost weight, except the bull calf "No. 9" of the table, and he had gained nothing.

Nos. 3, 5, and 6 of the table were in good flesh—not fat—and the rest were in thrifty condition, though in rather thin flesh.

TREATMENT DURING THE EXPERIMENT.

During the experiment all the animals were fed regularly three times daily at 6:30 A. M., noon, and 5 P. M. They were watered in the stall at 8 A. M., and again just before feeding at night. The milking was done just before the regular morning and evening feedings.

The animals were well groomed daily with card and brush. Every day, from 10 A. M, till noon, the cattle were turned into yards sheltered on the north and west. While in the yard they again had access to water. At this time also, each day, the stalls were well cleaned and littered. The cattle were salted twice each week. They were weighed on putting up, and regularly once each week thereafter at 4 P. M.

The cattle were attended throughout the experiment by one man, and especial pains were taken to secure regularity and uniformity in everything pertaining to the feed and care of the animals.

FEED AND FEEDING NOTES.

The rough feed was all cut into one-fourth to one-half inch lengths by a power cutter. The cornstalks were not very good, owing to bad weather while curing. The hay (timothy and clover, one-half each) and oat straw were of first quality. The meal, fed to the cows and steers, had 14 parts corn meal, 4 parts oat meal, and 9 parts wheat bran, by weight. That fed to the bull calves, and also to the Ayrshire steer, during the last six weeks of the experiment, was composed of one-third oat meal, one-third oil meal, and one-third wheat bran, by weight.

Exact notes of the feed given to each animal were kept, and any feed left in the mangers was also carefully noted and removed before the next feeding.

CONTENTS OF THE TABLE.

The table contains a concise description of each animal, and gives the in-

gredients and exact proportions of the average daily rations. It also presents a full showing, by fortnights, of the feed consumed, gains in weight and the milk yield.

In the column headed "Total Feed Consumed," the decimals are omitted, but the calculations based on this column were made with the *exact* numbers.

The losses in weight were put into the column marked "Gain in Weight," but the minus sign was prefixed in every case, thus (-36).

The two columns headed "Gain per Cent" were calculated as follows: The "gain per cent of live weight" was obtained by dividing the "gain in weight," each fortnight, by the weight of the animal at the beginning of the same fortnight. The "gain per cent of feed consumed" was obtained by dividing the "gain in weight," each period, by the "total feed consumed" in the corresponding period. In the fifth fortnight there was a slight gain in the milk yield of both cows. This is indicated in the column marked "pounds shrinkage" by the word "gain" over the proper number.

TABLE *Showing by Fortnights the Results of the Feeding Experiment.*

Description of Animals.				Feed Record.								Weights and Gains.					Milk Yield.		
				Average Daily Ration.															
Number of Lot.	Number of Animal.	Name, Breed, Sex, Age, Etc., *of Animals*	No. of Fortnight.	Meal.	Cut Hay.	Cut Corn Stalks.	Cut Oat Straw.	Sliced Rutabagas.	Ensilage.	Full Ration.	Total Feed Consumed.	Weight at Beginning of Fortnight.	Weight at End of Fortnight.	Gain in Weight.	Gain Per Cent of Live Weight.	Gain Per Cent of Feed Consumed.	Total No. of Pounds.	No. of Pounds Shrinkage.	Daily Average.
LOT I.	1	Lulu of Lansing. Ayrshire milch cow. Age 5 yrs. Dropped first calf Sept. 2, 1881.	1	7.	...	30.	...	15	...	52.	728	926	952	26	2.8	3.6	228.5	9.5	16.32
			2	7.	...	...	...	...	49.	56.	784	952	916	-36	...	...	218.5	10.	15.61
			3	7.	...	...	...	...	50.	57.	798	916	930	14	1.5	1.8	206.5	12.	14.75
			4	7.	...	...	...	...	65.	72.	1,008	930	957	27	2.9	2.7	192.	14.5	13.71
			5	7.	...	...	...	...	65.7	72.5	1,015	957	960	3	.3	.3	201.	*9.	14.36
			6	7.	...	...	...	...	63.7	70.7	990	960	976	16	1.7	1.6	191.	10.	13.64
	2	Hermia 2d. Shorthorn milch cow. Age 3 5-12 years. Dropped first calf Sept. 3, 1881.	1	7.	...	32.	...	15	...	52.	728	1,234	1,212	-22	...	...	193.	1.	13.79
			2	7.	...	...	...	...	59.	66.	924	1,212	1,185	-27	...	...	188.	5.	13.43
			3	7.	...	...	...	...	60.	67.	938	1,185	1,236	51	4.3	5.4	172.5	15.5	12.32
			4	7.	...	...	...	...	66.5	73.5	1,029	1,236	1,244	8	.6	.8	164.5	8.	11.75
			5	7.	...	...	...	...	62.	69.	966	1,244	1,268	24	1.9	2.5	172.	*7.5	11.29
			6	7.	...	...	...	...	62.	69.	966	1,268	1,264	-4	...	...	166.	6.	11.86
LOT II.	3	Batavia 2d. Devon steer. Age 1¾ years.	1	5.	5.75	9.	...	...	...	19.75	277	740	710	-30	...	...			
			2	4.5	6.5	...	...	...	21.5	32.5	455	710	760	50	7.	11.			
			3	5.	7.5	...	...	...	26.21	38.71	542	760	778	18	2.4	3.3			
			4	...	...	...	...	...	36.25	36.25	508	778	776	-2	...	...			
			5	...	...	...	...	...	41.82	41.82	585	776	760	-16	...	...			
			6	...	...	...	...	...	39.25	39.25	550	760	746	-14	...	...			
	4	Scott. Ayrshire steer. Age 1¾ years.	1	5.	5.75	9.	...	...	...	19.75	277	680	700	20	2.9	7.2			
			2	4.5	6.25	...	...	...	19.	29.75	417	700	736	36	5.1	8.6			
			3	5.	7.21	...	...	...	23.14	35.39	495	736	756	20	2.7	4.			
			4	3.	...	...	...	...	37.29	40.29	564	756	767	11	1.5	1.9			
			5	3.	...	...	...	...	44.82	47.82	669	767	774	7	.9	1.			
			6	3.	...	...	...	...	44.43	47.82	669	774	780	6	.8	.9			
LOT III.	5	Bonny Red Rose 2d. Shorthorn dry cow. Age 7 1-12 years. 4 months with calf.	1	3.5	7.5	11.5	9.5	15	...	47.	658	1,516	1,530	14	.9	2.1			
			2	3.25	6.25	9.5	8.5	...	15.	42.5	595	1,530	1,552	22	1.4	3.6			
			3	3.5	7.5	8.86	8.92	...	15.	43.78	613	1,552	1,570	18	1.2	2.9			
			4	3.5	...	...	...	...	73.43	76.93	1,077	1,570	1,594	24	1.5	2.2			
			5	3.5	...	...	...	...	81.18	87.68	1,228	1,594	1,630	36	2.3	2.9			
			6	3.5	...	...	...	...	78.50	82.	1,148	1,630	1,636	6	.4	.5			
	6	Crystal Queen 9th. Shorthorn dry cow. Age 5 5-12 years. 5 months with calf.	1	3.5	7.5	10.5	11.5	15	...	48.	462	1,492	1,530	38	2.5	8.2			
			2	3.25	6.25	9.5	0.	...	13.5	42.5	595	1,530	1,536	6	.4	1.			
			3	3.5	7.5	8.42	9.28	...	15.	43.7	612	1,536	1,594	58	3.8	9.5			
			4	3.5	27.75	...	...	...	...	31.25	438	1,594	1,605	11	.7	2.5			
			5	3.5	3.78	...	...	...	...	28.28	396	1,605	1,630	25	1.6	6.3			
			6	3.5	3.25	...	...	...	...	26.75	375	1,630	1,646	16	1.	4.3			
LOT IV.	7	*Helianthus*. Shorthorn bull calf. Age 1 year.	1	5.5	12.5	...	...	13	...	31.	434	598	650	52	8.7	12.			
			2	5.63	6.38	...	...	...	23.	35.01	490	650	678	28	4.3	5.7			
			3	5.28	6.78	...	...	...	27.57	39.63	555	678	726	48	7.1	8.7			
			4	5.	6.5	...	...	...	29.42	40.92	573	726	758	32	4.4	5.6			
			5	5.	6.39	...	...	...	29.96	41.35	579	758	802	44	5.8	7.6			
			6	5.79	7.29	...	...	...	30.	43.08	603	802	848	46	5.7	7.6			
	8	Horatio. Shorth'n bull calf. Age 11-12 years.	1	5.5	9.	...	...	14.5	...	29.	406	508	540	32	6.3	7.9			
			2	5.63	5.	...	...	...	24.50	35.13	493	540	568	28	5.2	5.7			
			3	6.	3.78	...	...	...	27.50	37.28	522	568	616	48	8.5	9.2			
			4	6.	3.85	...	...	...	28.92	38.74	542	616	650	34	5.5	6.3			
			5	6.	4.79	...	...	...	29.82	40.61	569	650	688	38	5.8	6.7			
			6	6.	5.36	...	...	...	29.79	41.15	576	688	720	32	4.7	5.6			
	9	Hamlet. Shorth'n bull calf. Age 9-12 years.	1	5.5	8.13	...	...	14.5	...	28.13	394	490	528	38	7.8	9.6			
			2	5.63	4.	...	...	...	24.50	34.13	478	528	560	32	6.1	6.7			
			3	6.	3.5	...	...	...	27.35	36.85	516	560	600	40	7.1	7.8			
			4	6.	3.32	...	...	...	29.50	38.82	543	600	631	31	5.2	5.7			
			5	6.	3.46	...	...	...	29.75	39.21	549	631	676	45	7.1	8.2			
			6	6.	4.39	...	...	...	29.82	30.21	563	676	708	32	4.7	5.7			

*Gain.

Comparisons Based on the Table.

1. *By Lots:*

LOT I.

During the first fortnight this lot had a daily ration of 14 pounds meal, 62 pounds dry cornstalks, and 30 pounds roots—a full ration. During the second and third fortnights, the daily ration was 14 pounds of meal as before, and 109 pounds ensilage—a full ration during the second fortnight, but the cows would have eaten more ensilage during the third, had it been given them. During the fourth, fifth, and sixth fortnights the daily ration was again 14 pounds meal, and 129 pounds ensilage—a full ration.

Here are the results:

Periods Compared.	Average Gain in Weight Per Fortnight.	Average Milk Yield Per Fortnight	Daily Average Yield of Milk.
	lbs.	lbs.	lbs.
First fortnight	4.	421.50	30.107
Second and third fortnight	1.	392.75	28.054
Fourth, fifth and sixth fortnight	24.66	362.17	25.869

Although the 92 pounds of roots and fodder had been entirely substituted by 109 pounds ensilage,—little more than pound for pound,—the returns of the second and third fortnights are little below the first; and when the ensilage is increased during the next three fortnights to 129 pounds,—less than 1½ pounds ensilage to one pound of fodder and roots,—the results are considerably better than during the first period. Of course, in interpreting the results of the above feeding, the natural shrinkage in milk yield must be taken into account. That the above shrinkages are not great, the following comparison will clearly show. Stewart Queen,—the only other cow that became fresh at the same time of year,—dropped her first calf Aug. 28, 1881. This cow had all the dry cut cornstalks she would eat, a little hay occasionally, a meal ration, richer, but a little lighter than that of Lot I, and, during February, a peck of roots daily.

Here are the figures:

Animals Compared.	Weight Dec. 1st, 1881.	Weight Feb. 23, 1882.	Gain in Weight.	Loss in Weight.	Daily Average Dec. 1-15.	Daily Average Feb. 1-23	Per Cent of Shrinkage.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Stewart Queen	1,040	1,000	....	40	9.71	8.15	16.07
Lot I—average of two cows	1,080	1,120	40	....	15.05	12.67	15.81

Stewart Queen is 3½ years old, and Nos. 1 and 2 of Lot I, 3 and 3 5-12 years respectively. It will be seen at once, from the above figures, that the cows in Lot I not only, gave, on the average, about 5 pounds more milk daily apiece, but their per cent of shrinkage is *less* than that of Stewart Queen. Nor is this all; for the cows of Lot I gain 40 pounds in weight apiece, while the other cow *loses* 40 pounds. A reference to the table will show, too, that the gain in weight of this lot was almost wholly upon the meal and ensilage ration.

LOT II.

The effect of ensilage in the mixed ration of this lot is very marked. For the sake of perspicuity the feed and returns are given side by side.

Period.	Feed Consumed Daily.	Gain in Weight per fortnight.	Loss in Weight per fortnight.
First fortnight	Meal, 10 lbs.; hay, 11¼ lbs.; cornstalks, 18 lbs.	....	10 lbs.
Second and third fortnights—average	Meal, 9¾ lbs.; hay, 13 7-10 lbs.; ensilage, 44 9-10 lbs.	62 lbs.	....

The ration of this lot was a full one during all the time covered by the above comparison; that is, the animals had all the rough feed they would eat.

LOT III.

This lot, of two dry cows, had 7 pounds meal, 15 pounds hay, 22 pounds cornstalks, 21 pounds oat straw, and 30 pounds roots, daily, for the first two weeks. The gain in weight during this time was 52 pounds.

During the second and third fortnights, the daily ration of this lot was 6¾ pounds meal, 13¾ pounds hay, 18¼ pounds each of cornstalks and oat straw, and 30 pounds ensilage. In other words the ensilage was substituted for roots, pound for pound, while the dry feed ingredients of the ration were cut down a little, to get the cows to eat the full allowance of ensilage. Again the gain in weight was 52 pounds each fortnight. This lot and also lot II were divided at the end of third fortnight. They will be noticed again.

LOT IV.

This lot, consisting of three bull calves, received daily during the first fortnight, 16½ pounds meal, 29½ pounds hay, and 42 pounds roots. During the second, third, and fourth fortnights, the average daily ration of the lot was 17 pounds meal, 14¼ pounds hay, and 80¾ pounds ensilage. For the fifth and sixth fortnights, the calves consumed daily, on the average, 17½ pounds meal, 15¾ pounds hay, and 89½ pounds ensilage. The gains of the lot for the different periods are here given:

	Pounds.
First fortnight, gain in weight	122
Second, third, and fourth fortnights, average gain in weight per fortnight	107
Fifth and sixth fortnights, average gain in weight per fortnight	118.5

The comparison seems to be unfavorable to ensilage; but before drawing any conclusions let us review the facts. At the end of the first fortnight, ensilage was made to take the place of the roots pound for pound, and also of 15 pounds *of the hay, three pounds for one. The ninety pounds of ensilage had in the 15* pounds hay and 45 pounds roots, a strong competitor, to say the least. The calves could not take this allowance of ensilage, as the table clearly shows. Yet, *during the last two fortnights, on nearly the full feed of ensilage, the gains* approach very closely to that of the first period.

2. *By Individuals:*

As Lots II and III were divided at the end of the third fortnight, the following

comparisons are of single animals, and cover the whole time of the experiment. Each animal is referred to by the number given in the table, and the daily rations and returns are brought together.

No. 3.

Time fed.	Daily Ration.	Returns per fortnight.
2 weeks	Meal, 5 lbs.; hay, 5¾ lbs.; cornstalks, 9 lbs.	loses 30 lbs.
4 weeks	Meal, 4¾ lbs.; hay, 7 lbs.; ensilage, 23¾ lbs.	gains 34 lbs.
6 weeks	Ensilage, 39 lbs.	loses 10⅜ lbs.

The superiority of ensilage over cornstalks as an ingredient in a mixed ration is marked. The loss on the 39 pounds of ensilage—all the steer would eat—is also significant.

No. 4.

Time fed.	Daily Ration.	Gains per fortnight.
2 weeks	Meal, 5 lbs.; hay, 5¾ lbs.; cornstalks, 9 lbs.	20 lbs.
4 weeks	Meal, 4¾ lbs.; hay, 6¾ lbs.; ensilage, 21 lbs	28 lbs
6 weeks	Meal, 3 lbs.; ensilage, 42 1-5 lbs	8 lbs.

Here the fluctuations are similar to those of No. 3, though not nearly as marked. During the last 4 weeks of the experiment, this steer would have eaten more ensilage had the allowance been increased. It is worth while to note that, *with three pounds of meal added*, No. 4, though not so hearty a feeder as No. 3, could eat 42 pounds of ensilage, while No. 3, on ensilage *alone*, ate only 39 pounds.

No. 5.

Time fed.	Daily Rations.	Gains per fortnight.
2 weeks	Meal, 3⅛ lbs.; hay, 7⅛ lbs.; cornstalks, 11⅛ lbs.; oat straw, 9⅛ lbs.; roots, 15 lbs.	14 lbs.
4 weeks	Meal, 3⅓ lbs.; hay, 7 lbs.; cornstalks, 9 1-5 lbs.; oat straw, 8¾ lbs.; ensilage, 15 lbs	20 lbs.
6 weeks	Meal, 3⅛ lbs.; ensilage, 78¾ lbs.	22 lbs.

The above is a strong showing for ensilage, especially as compared with roots.

No. 6.

Time fed.	Daily Rations.	Gains per fortnight.
2 weeks	Meal, 3⅛ lbs.; hay, 7⅛ lbs.; cornstalks, 10⅛ lbs.; oat straw, 11⅛ lbs.; roots, 15 lbs.	38 lbs.
4 weeks	Meal, 3¾ lbs.; hay 7 lbs.; cornstalks, 9 lbs.; oat straw, 8¾ lbs.; ensilage, 14¼ lbs.	32 lbs.
6 weeks	Meal, 3⅓ lbs.; hay 25¼ lbs.	17⅓ lbs.

This cow would not eat the full allowance of ensilage for several days, still her gain is a large one, though not equal to that of the first fortnight. During the next period, though getting all the good hay she would eat and the regular allowance of meal, the gain is less.

Condition of the Animals at the Close of the Experiment.

The cattle continued to eat with relish throughout the experiment. All the animals were sleek, lively, and apparently in excellent health when the experiment closed. Even the Devon steer, No. 3 that had been losing weight on an exclusive ensilage diet, began to gain at once, on a ration of ensilage and meal, showing that his constitution had not been injured.

Comparative Feeding and Cost Value of Ensilage.

The meal fed to the cows is worth $22.40 per ton. That fed to the bull calves, $25. Hay is worth $10, and corn stalks and oat straw each $5 per ton, and rutabagas 40 cents per bushel.

Compared with the other feeds at the above rates, the ensilage has a feeding value four times the cost of growing the crop and putting it into the silo.

I was not at all sanguine, when we began the experiment, as to the decided merits of ensilage as claimed by many writers, but I have been greatly pleased with the results of the feeding. The convenience in handling the prepared fodder; the large amount that can be stored in a small space; the avidity with which cattle eat it and thrive and grow when a meal ration is fed with it; the fact that it can be stored in a wet time, during lowery weather, when fodder could not be cured; the furnishing of succulent food for stock during our long winters at very small cost,—these are some of the reasons that lead me to think that the ensilaging of corn especially will prove to be a practical and profitable method of preparing food for stock. I think it may take the place of roots and be a cheap substitute for them. I am disposed to believe that the best results will be secured by feeding one daily ration of dry fodder in connection with the ensilage. The experiment shows that it is not a complete food ration. A meal ration adapted to the animal and the desired result must be fed with it. The winter has been exceptionally favorable for the feeding of fodder of this character, on account of its extreme mildness, the mean temperature having been about 28° during the time embraced in the feeding With severe weather the results might be less favorable. On account of changes in his laboratory, and domestic afflictions, our chemist, Dr. R. C. Kedzie, was unable to make such chemical investigations during the feeding experiment as we had desired. A sample of ensilage from the college silo was therefore sent to Prof. George H. Cook, director of the New Jersey experimental station, with the request that it be analyzed. Prof. Cook had the analysis made very promptly and refused all proffered compensation. I am under special obligations to him for this favor and his permission to publish in this connection his report of an experiment in feeding ensilage, giving results of interest, especially from a chemical standpoint.

To Mr. W. P. Latta, my assistant, I am greatly indebted for most faithful and intelligent work during the entire time of carrying out this experiment.

It will be borne in mind by any who may think we have been needlessly lengthy in making our report in detail, that it is published mainly for the purpose of giving plain facts to the farmers of our State, who have not given much attention to this subject.

The experiments will be continued another season. We shall plant several varieties of corn, sugar cane, millet, and other forage crops, to ascertain as far as we can their comparative values for ensilage.

Hoping that the expense incurred may result in giving practical information

of real value, and so aid in advancing the agricultural interests of our State, I respectfully submit this report.

SAM'L. JOHNSON,
Professor of Practical Agriculture and Supt. of the Farm.

AGRICULTURAL COLLEGE, June 1, 1882.

The report of Prof. Geo. H. Cook, Director of the New Jersey Experimental Station, referred to above, is as follows:

On November 16th four cows of native breed were taken from the herd at the college farm, placed side by side in the same barn, and for a term of ninety-one days were fed, exercised, and milked at the same time.

During the first period of twenty-eight days a ration was divided among them, made up of twenty-two and one-half pounds of clover hay, forty-nine pounds of wheat straw, seventy-five pounds of brewers' grains, seventy-five pounds of turnips, and seven and one-half pounds of cotton seed meal. It was calculated to furnish daily to each 1,000 pounds of live weight,

2.5 lbs. digestible protein.
0.5 lbs. digestible fat.
12.5 lbs. digestible carbhydrates.

This being, according to German investigators, the necessary amount of food.

For the second period of twenty-eight days no change was made in the ration fed cows Nos. I andII, while in that fed III and IV, 100 pounds of ensilage were substituted for 40 pounds of turnips; in other respects it remained the same as that fed during during the first period; it furnished daily to each 1,000 pounds of live weight,

2.50 pounds digestible protein.
.90 pounds digestible fat.
14.90 pounds digestible carbhydrates.

This was fed in order to determine whether an increased amount of the heat-producing compounds, fat and starch, was rendered necessary by the severity of the weather. The additional food caused no increase in the yield of milk; cows I and II on the poorer ration gave during this period more milk than during the preceding.

Our intention thus far was to ascertain the quantity of food required to keep these cows up to their full yield of milk.

For the third period, of five weeks ending February 17, Nos. I and II were fed the same as during the first and second periods; to III and IV an equal amount of digestible food was given daily, in 120 pounds of ensilage and five pounds of cotton seed meal per cow; it was eaten without waste and with apparent relish.

We tabulate below the yield of milk for 13 weeks. It must be remembered that during the first period all four cows received the same ration; that during the second and third periods cows I and II received the same as during the first; that cows III and IV were fed during the second period with an unusually rich ration, and during the third period with one made up of ensilage and cotton seed meal alone, containing, however, an amount of food equal to that fed during the first period.

TABLE SHOWING THE YIELD OF MILK.

	I. 7 yrs. old. Calved July 15.	II. 9 yrs. old. Calved Oct. 8.	III. 6 yrs. old. Calved Oct. 23	IV. 6 yrs. old. Calved Oct. 10.
	lbs.	*lbs.*	*lbs.*	*lbs.*
Average daily yield for 1st period	23.5	25.1	25.6	24.1
" " " " 2d "	25.2	26.1	24.9	24.
" " " " 3d "	25.2	23.2	23.8	24.
Average daily yield for 91 days	24.6	24.8	24.8	24.

An opportunity is here offered to call attention to the fact that up to a certain point the yield of milk may be influenced by the quantity of digestible food; but beyond this point which is determined by breed, time of calving, and individual peculiarity, an increased amount of food fails to increase the yield of milk. Ensilage can produce no more milk than any other fodder which contains an equal amount of food, a point well illustrated by the above table.

While the yield of milk and its percentage of butter cannot be increased at will, it is well-known that its quality may be very materially influenced by the feeding. It is claimed for ensilage that it makes "winter butter equal to June butter," a claim willingly admitted, butter made from the fodder being to our knowledge of unusually fine color and flavor.

The composition of ensilage is by no means constant, as the following table of analyses shows; soil, variety of corn, method of planting and cultivating, and above all, the time of harvesting exert a decided influence on its quality.

The samples furnished by Mr. Platt and Messrs Whitman & Burrill had the characteristic vinous smell which indicated that they had been exposed to the air before reaching the laboratory—and probably an analysis of a perfect sample would have indicated a larger amount of nutritive matter. From personal observation at the silo, we know that Mr. Platt's ensilage was as well preserved as any we have seen.

In this table the samples have been arranged with reference to their percentage of water and carbhydrates:

	Loss at 212° F. Pr. Ct.	Protein. Pr. Ct.	Fat. Pr. Ct.	Fiber. Pr. Ct.	Ash. Pr. Ct.	Carbhydrates. Pr. Ct.
Mr. Mills, Pompton, N. J	77.4	1.02	0.68	6.85	1.00	13.04
Mr. Morris, Oakland Manor, Md	78.51	.88	0.62	6.43	1.53	12.03
Buckley Bros., Port Jervis, N. Y	80.86	1.27	0.67	5.47	1.00	10.73
Coe Bros., West Meridian, Conn	82.10	1.21	0.71	5.34	1.02	9.62
Mich. State Agricultural Col., Lansing	82.27	1.63	0.76	4.72	1.94	8.68
College Farm, New Brunswick, N. J	83.52	.94	0.65	5.18	1.43	8.28
Mr. Platt, Suffield, Conn	83.56	1.06	0.73	5.76	.81	8.08
Whitman & Burrill, Little Falls, N. Y	83.54	1.06	0.50	5.85	1.40	7.65
James Lippincott, Mt. Holly, N. J	84.28	1.37	0.50	4.68	1.26	7.91
Dr. J. M. Bailey, Billerica, Mass	84.87	1.06	0.45	5.61	.96	7.09

The amount of ensilage to be used depends entirely upon its quality and upon the plans of the farmer.

Mr. Mills, for instance, could make up a full ration for a cow of 1,000 pounds live weight, by feeding daily eighty pounds of his ensilage and five and

one-half pounds of cotton seed meal; while at the college farm, with five pounds of cotton seed meal, one hundred and twenty pounds were necessary. In these rations nearly all the carbhydrates needed, and a portion of the protein and fat is furnished at a very low price by the ensilage; the balance of the protein and fat is drawn from the cotton seed meal. If desirable, a much smaller quantity of the ensilage could be used, and the carbhydrates given in form of corn meal or any feed rich in these compounds; in ensilage they can be had however, much cheaper than in any feed known to us at present. One thing must be considered: If the quality of the ensilage obliges the farmer to feed his cows more than eighty or ninety pounds daily per head, there is reason to fear they will scour. The amounts fed by the above named gentlemen have varied from sixty-five to eighty pounds, and with these amounts no trouble whatever has been experienced. We therefore conclude that if the ensilage is of first-class quality, eighty pounds per day will furnish an animal with the full amount of carbhydrates; if it is of medium quality, it will be safer to limit the amount to about ninety pounds, furnishing the rest of the carbhydrates in form of feed or straw.

From the above experiment we feel justified in concluding that milch cows can be safely fed large quantities of this fodder, and that it is a perfect substitute for hay. The question of expense we reserve for a future bulletin.

ENSILAGE EXPERIMENTS OF 1882-3.

Is an acre of corn grown for fodder, ensilaged, worth more to feed cattle; will it go farther than if cut up and dried in the ordinary way? is a question often asked, but still not answered conclusively. While the answer possibly may be in the negative (I am not of that opinion), it by no means follows that ensilage would not even then have a very important place among our cattle foods. If the reply should be in the affirmative, then, on the score of economy, convenience in handling, and value, it would be almost indispensable on a stock farm. This would be especially true where cows were kept for dairy purposes, as ensilage being a succulent food, is calculated to produce a liberal yield of milk.

To still further test the value of ensilage as a practical, economical method of storing and preserving fodder fresh and juicy for winter feeding—as a chief substitute for roots—as a part ration with straw and coarse fodders, and especially in comparison with corn grown on adjacent plats and under the same conditions as the ensilage; but cut up and cured with great care in the ordinary way—were the thoughts in mind in planning our feeding experiments for 1882 and '83.

ANIMALS CHOSEN FOR THE EXPERIMENT.

Three lots of cattle were selected from the college herd December 18, 1882.

Lot I.

consisted of three bulls, two Shorthorns and one Ayrshire. No. 1, a Shorthorn bull calf, aged 9 months; No. 2, an Ayreshire bull, aged 15 months; No. 3, a Shorthorn bull, aged 14 months.

Lot II.

was composed of two large dry cows, Shorthorns, nearly alike as to weight, condition and feeding qualities. No. 4, aged 6 years; No. 5, aged 8 years.

Lot III.

was made up of four milk cows; three Ayrshires and one Shorthorn. No. 6, Ayreshire, aged 3 years, calved October 2, 1882; No. 7, Ayreshire, aged 4 years, calved September 29, 1882; No. 8, Ayreshire, aged 4 years, calved October 4, 1882; No. 9, Shorthorn, aged 4 years, calved November 24, 1882.

PREVIOUS TREATMENT.

Owing to the mildness of the fall weather the cows were turned out during the day until about the first of December, when they were given dry cornstalks and meal twice daily. The three bulls had been let out during the summer previous, only for exercise.

During the month of November all the cows selected for the experiment had lost weight except No. 4 (Stewart Queen 9th), she having gained nothing. The bulls had each gained in weight.

They were all in good or fair condition except No. 9 (Hermia 2d); she, having dropped a calf a short time previous, was rather thin in flesh.

TREATMENT DURING THE EXPERIMENT.

The cattle were attended throughout the experiment by one person, and pains was taken to secure regularity in everything pertaining to the feed and care of the animals.

The animals were fed regularly three times daily at 6:15 A. M., 11:30 A. M., and 4:30 P. M. *They were watered in the stall at* 9 A. M., *and had access to* water when turned out to exercise, from 2 P. M., till 4 P. M.

The milking was done just before the regular morning and evening feedings.

The animals were daily groomed with card and brush; the stables were cleaned and littored both morning and afternoon. Salt was given regularly three times *each week. They were weighed on putting up, and regularly each week there-*after at 3:30 P. M. The time of feeding consisted of periods of three weeks each.

FEED AND FEEDING NOTES.

The rough feed was cut into one-fourth and one-half inch lengths by a power cutter. The cornstalks, dried corn fodder, and hay were all of good quality. The meal had 14 parts corn meal, 4 parts oat meal, and 9 parts wheat bran by weight.

During the second and third periods the bulls had daily one pound of oil meal each, besides their regular feed of corn and oat meal and wheat bran. One pound per day of oil meal was given No. 8 during the third week of the first period. Exact notes were kept of feed given to each animal, and if any was left in mangers it was weighed and deducted from amount given.

COMPARISONS BY LOTS.

Lot I.

During the first period this lot had a daily ration of 15.95 pounds of meal 38.90 pounds hay, and 44.75 pounds roots. During second period 20 pounds of meal, 28.89 pounds of hay, and 42.89 pounds of ensilage. During the third period 20 pounds of meal 29.73 pounds of hay, and 69.77 pounds of ensilage.

GAINS IN WEIGHT.

	Gain.
First period	187 lbs.
Second period	83 "
Third period	118 "

They were each given all the hay they would eat during the three periods, and during the first period nearly all the roots they would eat. During the second and third periods ensilage was substituted for roots, and they had what they would eat up clean once a day.

Lot II.

During the first period this lot had a daily ration of 6 pounds of meal, 12 pounds of hay, and 29.42 pounds of cut cornstalks; during the second period 6.38 pounds of meal, 12 pounds of hay, and 89.94 pounds of ensilage; during the third period 6 pounds of meal, 12 pounds of hay, and 105 pounds of ensilage.

GAINS IN WEIGHT.

	Gain.
First period	126 lbs.
Second period	22 "
Third period	32 "

During the first period they had all the cornstalks they would eat, but when ensilage was substituted for the corn stalks they were limited to 50 and 55 pounds respectively.

Lot III.

During the first period this lot received 28.33 lbs. of meal and 78.34 lbs of dried corn fodder.

During the second period 28 pounds of meal and 236.62 lbs. of ensilage.

During third period the lot was divided; Nos. 6 and 7 receiving as a daily ration 14 pounds of meal and 133.06 lbs. of ensilage, about the same amount they had received during the second period. While Nos. 8 and 9 received 14 lbs. of meal and 37.09 lbs. of dried corn fodder, about the same amount they had received during the first period.

Number 8 during the second period received, in addition to the regular feed, a feed of 3.42 lbs. of hay per day.

GAIN OR LOSS IN WEIGHT.

	Gain.	Loss.
First period	....	133
Second period	116	....
Third period (Nos. 6 and 7)	24	....
Third period (Nos. 8 and 9)	....	50

	Milk Yield.	Daily Average.
First period, Lot III (Nos. 6 and 7)	614⅜	29.26
Second period, " " " " "	636⅜	30.30
Third period, " " " " "	584⅜	27.83
First period, Lot IV (*Nos. 8 and 9*)	681⅜	32.45
Second period, " " " " "	655	31.19
Third period, " " " " "	569⅜	27.11

From the table it is seen that during the first period, when the ration was simply meal and dried corn fodder, that there was a loss of 133 pounds of flesh, but that when ensilage was substituted for dried corn fodder, there was a marked increase of 116 lbs , and a daily increase of milk.

During the last period the cows fed on ensilage still gained, while those fed dried corn fodder lost in weight. Although during the first and second periods lot IV gave considerable more milk than lot III. yet when, during the third period, lot IV had dried corn fodder substituted for ensilage, their yield *of milk fell below that of lot III.*

BY INDIVIDUALS.

No. 1.

Time Fed.	Daily Ration.	Gain.
First period	Meal, 4.95 lbs.; hay, 9.40 lbs.; roots, 14.28 lbs.	26
Second period	" 6 " " 7.11 " ensilage, 10.52 lbs.	24
Third period	" 6 " " 7.37 " " 21.11 "	38

The decrease in the amount of gain the second period was due to the fact that it took this animal some time to become accustomed to eating ensilage.

During the third period the amount of ensilage was increased, and there was quite an *increase in weight.*

We have rarely found an animal that does not eat the ensilage with avidity from the start.

No. 2.

Time Fed.	Daily Ration.	Gain.
First period	Meal, 5 lbs.; hay, 13.24 lbs.; roots, 15.23 lbs.	71
Second period	" 6 " " 9.23 " ensilage, 15.30 lbs.	11
Third period	" 6 " " 10.06 " " 23.33 "	24

During the second period there was a greater falling off in this case than in the other, but nearly as large a gain during the third period.

No. 3.

Time Fed.	Daily Ration.	Gain.
First period	Meal, 6 lbs.; hay, 16.16 lbs.; roots, 15.23 lbs.	90
Second period	" 8 " " 12.21 " ensilage, 17.06 lbs.	48
Third period	" 8 " " 12.16 " " 25.33 "	56

Notes on No. 1 apply here.

Table Showing by Periods of three Weeks, the Results of the Feeding Experiment.

Number of Lot.	Number of Animal.	Name of Animal.	Number of Period.	Average Daily Ration: Meal.	Cut Hay.	Cut Cornstalks.	Cut dried Corn-fodder.	Ensilage.	Sliced Rutabagas.	Full Ration.	Total Feed Consumed.	Weights:—Gains and Losses: Weight at beginning of period.	Weight at end of period.	Gain in weight.	Loss in weight.	Gain per cent of Live weight.	Milk Yield: Total No. pounds.	No. pounds gain.	No. of pounds shrinkage.	Daily Average.
Lot I.	1	College Baron.	1	9.45	9.46				14.28	28.69	601	770	796	26		3.8				
			2	6.	7.11			10.52		23.63	496	796	820	24		3.				
			3	6.	7.37			21.11		34.48	724	850	888	38		4.7				
	2	Horace of Lansing.	1	5.	13.24				15.23	33.47	702	683	754	71		10.4				
			2	6.	9.26			15.30		30.56	641	754	765	11		1.4				
			3	6.	10.23			23.33		39.56	830	780	804	24		3.				
	3	Hebe's Baron.	1	6.	16.16				15.21	31.39	659	890	980	90		11.				
			2	8.	12.21			17.06		37.27	782	980	1028	48		4.9				
			3	8.	12.16			25.33		45.49	955	1050	1106	56		5.3				
Lot II.	4	Crystal Queen 9th.	1	3.	6.	13.44				22.44	741	1400	1430	30		2.1				
			2	3.19	5.80			43.52		52.51	1102	1430	1460	30		2.				
			3	3.	6.			50.		59.	1239	1440	1454	14		.9				
	5	Bonny Red Rose.	1	3.	6.	15.97				24.97	524	1512	1608	96		6.3				
			2	3.19	6.			53.09		62.28	1307	1608	1600		8					
			3	3.	6.			55.		64.	1344	1580	1598	18		1.1				
Lot III.	6	Phylletta.	1	7.			21.42			28.42	596	887	864		23		325¼			15.50
			2	7.				64.94		71.49	1501	864	902	38		4.3	339	13¼		16.14
			3	7.				67.24		74.24	1559	890	918	28		3.1	309		30	14.71
	7	Stewart Queen.	1	7.			21.99			28.99	608	960	954		6		289			13.76
			2	7.				63.78		70.78	1486	954	966	12		1.2	297¼	8¼		14.16
			3	7.				66.11		73.11	1535	960	956		4		275½		22	13.11
	8	Lulu of Lansing.	1	7.	3.42		12.18			22.60	474	926	892		34		187½			8.92
			2	7.				43.47		50.47	1059	892	912	20		2.2	191½	4		9.11
			3	7.			17.73			24.73	519	910	910				170		21½	8.09
	9	Hermia 2d.	1	7.			22.73			29.73	624	1250	1180		70		474			22.57
			2	7.				65.47		72.47	1517	1180	1226	46		3.9	463¼		10½	22.07
			3	7.			19.35			26.35	553	1170	1120		50		399½		64	19.02

TEMPERATURE.

The temperature was much colder during the entire period of feeding than during the experiments a year ago. At 8 o'clock each morning a note was

taken of the temperature as indicated by the thermometer, the direction of the prevailing wind, the aspect, and the humidity.

The prevailing wind on a majority of days was from the southwest.

Temperature.	1st Period.	2d Period.	3d Period.
The maximum temperature	40°	31°	48°
The minimum temperature	6°	-18°	-10°
The average temperature	25.66°	11.85°	19.18°

I am under obligations to the Chemical Department over which Dr. Kedzie presides, for the following analyses of samples of the ensilage and fodder corn used in the experiments.

The corn fodder contained 22.85 per cent of water, while the ensilage contained 79.60 per cent of water.

The results of analysis are calculated water free.

	Corn Fodder.	Ensilage.
Cellulose or fiber	32.15	27.75
Carbo-hydrates (not fat)	52.02	46.42
Albuminoids (protein)	7.00	7.15
Ether extract, fat, wax, etc	1.95	1.19
Ash	6.88	5.49
Acid	....	12.00
	100.00	100.00

The per cent of carbo-hydrates and albuminoids in the ensilage show it to have been of good quality. The per cent of acid seems large; but not larger than some other samples here shown.

CORN FODDER GROWN FOR ENSILAGE AND FOR DRIED FODDER.

The land upon which it was grown was a sandy loam. Bailey's ensilage corn and Chester county corn were grown on the same plat in rows four feet apart, dropped in drills and covered with hoes. It was cultivated four times with a one-horse double-shovel cultivator. It attained a large growth, had a few ears and had become a little brown at the butts of the stalks when cutting was commenced September 12. The filling of the silo being finished September 15, it was covered September 16 and weighted with 100 pounds of stone to the square foot.

The area of corn put in the silo was 211 rods, yielding 46,763 pounds. The dried corn fodder was grown on an area of 64 rods, yielding, when dried, 4,350 pounds. This would make the weight of ensilage grown on one square rod 221 pounds, or 35,360 pounds per acre. The yield of dried corn fodder per rod was 68 pounds and 10,880 pounds to the acre. In other words, 3¼ pounds of ensilage makes 1 pound of dried fodder.

The weight of corn in silo—weighed as it was put in September 12, 13, 14, 15—51,433 pounds. The silo was opened December 15 and each load taken out was carefully weighed and a record kept. Finished the feeding April 1, but a few cubic feet of the ensilage left in the silo at this writing, June 8, seems after the surface is removed in a good state of preservation. The number of pounds weighed out was 44,315. This indicates a loss of 7,118 pounds or about

15 per cent. I estimate the loss in weight of the fodder corn by drying out in the barn about the same as ordinary hay, from 15 to 25 per cent.

The analysis of the fodder corn shows a large per cent of water, although the fall had been quite favorable for curing thoroughly. I have always found difficulty in drying corn fodder so that it could be stored without injury in large quantities. Here is one advantage in storing in a silo: If the work has been properly attended to, cover and weights on, you may be quite certain that the ensilage will come out in good shape. You will be saved the vexation of watching and turning your fodder, unbinding and binding, and seeking out new devices to prevent the fodder corn from moulding, which it is so likely to do. I am inclined to believe that the green corn can be cut and placed in the silo at as little cost as the fodder can be cut, dried and passed through the cutting box before feeding; and this, too, at a season of the year when the work can be more economically performed than in the winter.

SILOS.

I need only to add to my former report on this point that experience confirms the statement then made that any material may be used in the construction of silos that will exclude the air; that it is better to have several silos, or divisions, rather than a very large one; that weighting with stone, barrels of earth, or sacks of grain is likely to be more satisfactory than a screw, which may not receive attention at the right time; and that the silo is one of the most economical methods of providing shelter for fodder. In no way, perhaps, can the same equivalent in dried fodder be secured with so little expense. Several silos were built in the State last year of wood, and I have yet to learn that any one of them has proven a failure.

The results of the experiment, so far as comparing ensilage with dried fodder corn, show that when ensilage was substituted for the fodder corn in the second period, there was an increase in the weight of the cows and in the milk yield from Nos. 6, 7 and 8, while No. 9 shows an increase in weight, but a shrinkage in milk yield. I should here say that the corn fodder was of good quality, and the cows were fed what they would eat clean. It will be noticed that the daily ration of corn fodder equals in weight nearly one-third of the daily ensilage ration. I am confirmed in the belief that three tons of the ensilage is equal in feeding value to one ton of hay. The yield of ensilage corn was eighteen tons per acre, equivalent in feeding value in a combined ration to six tons of hay. Ensilage means the growing of an equivalent to six or ten tons of hay per acre. Admit, only, that three pounds of ensilage will take the place of one pound of hay in a mixed cattle ration, even then, if animals fed with it thrive, are healthy, and present a general appearance much like that resulting from grass feeding, coming out, after four or five months' confinement, with sleek coats, with not much, if any, loss of weight, and with no more shrinkage of milk yield than we ought reasonably to expect as the time from calving increases, we must conclude that there is some virtue in fodder prepared in this manner Claim only this, and is it not a profitable and a practical method of securing large yields of corn, sorghum, and other forage crops, and preparing them for convenient and economical feeding?

It is to be regretted that so many extravagant statements have been made in relation to the value of ensilage—the number of cattle that could be kept from the product of a single acre, etc. Practical, thinking men have been deterred from investigating this subject and giving it such attention as it really deserves, because of the wild statements of impractical enthusiasts.

ENSILAGE A CHEAP SUBSTITUTE FOR ROOTS.

I am more than ever convinced that the idea I suggested two years ago that ensilage will prove a cheap substitute for roots, will be approved by any farmer who will make the trial. Farmers who have had experience in feeding stock know how desirable it is to have some succulent food as a part ration at least, *during our long cold winters.* Roots are a desirable cattle food, but an expensive crop for the average farmer to raise and handle. But few farmers have the facilities for storing them in any quantity. They must be buried in the field; and in the winter with the thermometer below zero, digging out the roots and getting them to the stock is not a desirable task. If ensilage will give us the succulent food at less cost, in shape to be easily handled and occupying but a small space in storage, it must prove of value. What are the farmers in Michigan to do with the coarse fodders raised on our farms, but to feed them. They are too bulky to transport to market—they must help make beef and mutton, but the farmer needs something to feed in connection with them to make them of more value, and the ensilage will help out in this direction.

The large number of silos erected during the last year in all parts of our country, indicates that ensilage has the sanction of a number of our leading farmers, and that actual tests confirm reasonable claims as to its value as a cattle food. The farmers of Great Britain, too, are greatly interested in this subject, and it has received the favorable attention of some of the leading English agriculturists.

To Mr. Will E. Hale, class of '82, I am under obligations for most careful and efficient aid in the carrying out of these experiments.

Respectfully submitted,

SAM'L JOHNSON,

Prof. of Practical Agriculture and Supt. of the Farm.

AGRICULTURAL COLLEGE, June 8, 1883.

THE RIPENING OF WHEAT.

BY R. C. KEDZIE.

[First published in Report for 1881-'82.]

The wheat crop of the United States is of great importance, because it is a staple agricultural production in nearly every State and territory of our Union. The grain is also important, because it furnishes the leading article of food for civilized man. Both as consumers and producers, Americans are interested in this leading cereal. Any circumstance, therefore, which may affect its production or modify its nature as food, becomes a matter of general interest.

One of the circumstances which has a modifying influence upon the quantity and quality of wheat is the time of cutting the grain. There is some diversity of opinion respecting the time when wheat should be cut in order to secure the best results, some advocating early cutting, and others recommending that the grain should become dead ripe before harvesting. The plea for complete ripening, like the plea for flinty wheats as a class, is based upon the claim that only the hard and flinty wheats have the desirable amount of gluten; that the early ripened and the soft wheats are so deficient in gluten that good flour cannot be made from them, and only the hard wheats possess the requisite amount of gluten.

The true explanation of this exaltation of the flinty wheats, and the depreciation of the soft wheats, is that there has been a revolution in the methods of milling by the introduction of the patent process. Under the old method of milling when the grinding was completed at one operation, the soft wheats were in demand, and early cutting, while the "berry was in the dough," was recommended. But since the new process has been introduced, in which the grinding is accomplished in successive stages, and the highest prized and priced flour is now made from the middlings, which formerly were discarded as unfit for human food, a very different quality of wheat is desired. The soft wheats are no longer in demand, but the hard and flinty wheats which will produce the largest amount possible of middlings for purifying, making the "new process flour." The farmer is urged to discard his white winter wheat, and to let his wheat stand till dead ripe, in order to secure the hard and flinty berry. This is fair and legitimate, and shonld give offense to no one, for the miller has the right to give the preference to one quality of wheat berry over another quality; but the case becomes different when he alleges as the ground for such preference that the soft wheat is so deficient

in gluten as to be incapable of making good flour, and that the formation of gluten is one of the latest acts in ripening of wheat, and that the early ripened berry is so deficient in gluten as to be unfit for milling. The question, then, becomes one not of physical texture but of nutritive value. The farmer resents the imputation that his grain is deficient in the most important nutritive principle, while the consumer becomes solicitous lest he may be using a flour not up to the standard in nutritive value.

There would have been less heat in this discussion if the miller had frankly said that in consequence of a great change in the process of milling, wheat of a very different texture is now in demand, without attempting to drive out the wheats which had been standards of excellence by representing them so deficient in gluten as to be unfit for his use. The farmer replies: "My white winter wheat had enough gluten five years ago, and commanded the highest price. Why has it become so poor in gluten?" It is hardly fair for the miller to attempt to cover his change of base from white to flinty wheats by this flank movement of asserting that the soft wheats are deficient in gluten.

But if it is true that the hard and flinty wheats alone contain the desirable quantity of gluten, and that gluten is the last principle developed in the process of ripening, it is important for all classes that the facts should be known, because in the long run the truth can wrong no one.

We are told that the wheat of warm climates is richer in gluten and more flinty in texture than wheat of cold climates. Some persons seem to assume that the flinty quality of such wheat is in consequence of its large content of gluten, and that the hardness of any wheat is proportioned to its content of gluten; that since the wheat of this climate becomes more flinty by over-ripening, this change must be attended by an increase of gluten in the last stages of ripening.

The composition of wheat at different periods of growth seemed to me a subject of so much importance that I determined to give it a careful investigation. In such a study it was not my desire to view the subject from the standpoint of either the farmer or the miller. My aim was to establish data rather than to formulate opinions. It seemed to me that for such an investigation the most trustworthy conditions would be furnished by chemical analysis of the wheat at different stages of growth.

SELECTING SPECIMENS.

A field of Clawson wheat, which appeared to be very uniform in its growth and in the quality of its soil, was selected for one set of specimens, and another similar field of Schumacher wheat for a parallel set of specimens. I decided to take two sets of specimens of different varieties of wheat in order to eliminate the influence of individual peculiarities in either variety.

I began to gather my specimens on June 26, 1879, and gathered a specimen of each variety at 9 o'clock A. M. for twenty-one successive days, a period embracing the progressive changes of the berry from its early formation, and before the contents of the berry were milky in color, up to the time of dead ripeness. The Schumacher, however, was found to be somewhat in advance of the Clawson through the whole series, and the berry was in the milk at the first cutting. It seemed to keep about five days in advance of the Clawson.

A small bundle of the grain was cut, labeled, and placed to ripen and dry in an airy room, so as to give the best possible conditions in harvesting, and every bundle was subjected to the same treatment in drying and ripening. When fully dry the grain was beaten out by hand, winnowed, and preserved in glass jars for chemical analysis. The grain thus ripened on the stalk, as it slowly dried in the sheltered room, was different from what it would have been if threshed out as soon as cut, but the difference was the same for all, and the grain thus matured would represent the results secured by ripening under the most favorable conditions of harvesting at the several periods of cutting.

CONDITION AT TIME OF CUTTING.

The following diary will give some idea of the condition and development of the berry and the ripening of the stalk at the successive periods of cutting. I also include a brief statement of the condition of the weather, which may assist in explaining the rapid changes which took place at certain stages of growth:

No. of Cutting.	Mean Daily Temperature.	Degree of Ripeness of Stalk and Berry of Clawson Wheat at the Several Periods of Cutting.	Degree of Ripeness of Stalk and Berry of Schumacher Wheat at the Several Periods of Cutting.
1	77⅜° Cloudy.	Stalk green; berry watery and immature; a little milky.	Stalks green: berry milky, easily crushed by fingers, sweet.
2	75° Rain.	Stalk green, and leaves rusted slightly; berry very immature, somewhat milky.	Stalk green; berry easily crushed by fingers, milky and sweet.
3	82⅓° Rainy.	Berry milky and sweetish; color of berry green.	Berry more milky, but greenish; can be crushed by fingers, sweet.
4	68°. Cloudy.	Berry milky and sweet; still green in color.	Berry yellowish, milky dough; fingers stained by milk when being crushed.
5	70⅜°. Clear.	Berry milky, sweet, green; no dough.	Straw becoming yellow; berry in milky-dough condition.
6	72⅔°. Clear.	Straw still green; berry milky, sweet, greenish in color, no dough.	Berry in the dough; crushed between thumb nails stains them.
7	77⅜°. Cloudy and raining.	Stalks green, but leaves yellow; berry more milky, sweet, yellow-green.	Straw purplish, but leaves green; berry in the dough and becoming yellow.
8	79°. Hot and close, cloudy.	Straw green; heads yellowish; berry yellow-green, thick milk, sweet.	Head brown; berry deep yellow, stiff dough, can be crushed by thumb nails.
9	66⅔°. Cooler and cloudy.	Stalks and heads turning yellow; berry milky-dough, sweet.	Berry brown, hard; difficult to crush between thumb nails.
10	71⅔°. Clear.	Stalks and heads yellowish-green; berry less sweet and more doughy.	Berry crushes dry; grain harvested to-day.
11	78°. Rain in night.	Stalks yellowish; heads begin to bend; berry thin dough, a little sweet.	Straw purplish red and fully ripe.
12	73°. Rainy.	Straw yellow; heads bend more; berry in the dough, only a little sweet.	Heads bend over; stalks becoming brown and leaves dry.
13	75⅔°. Cloudy.	Heads bend over; berry stiff dough.	
14	74°. Clear.	Berry crushed dry between thumb nails; harvested to-day.	
15	76°. Rain in night.	Berry nearly dry and becoming hard; straw entirely ripe.	
16	75°. Cloudy.	Berry dry and hard; stalks a full yellow.	
17	73⅓°. Clear.	Stalks over-ripe; berry shells on handling sheaf.	Ripe and over ripe.
18	79°. Clear.	Stalks becoming brittle.	
19	81°. Clear.	Stalks becoming brown and brittle.	
20	85⅜°. Cloudy.	Manifestly dead-ripe.	
21	78°.	"Still dead."	

The condition of the grain after-ripening on the stalk is best exhibited by the specimen of each day's cutting now placed before you.

THE GROSS PRODUCT PER ACRE AT EACH CUTTING.

The amount of grain as influenced by the period of cutting is a question of practical importance to the farmer. In making this estimate I confined my attention to the weight of perfectly dry berry, because I was satisfied that any variation in amount of grain, attendant upon changes during growth, arises from variation in the size and weight of the berry, and not from any change in the number of grains growing on a given area, since new grains would not form during the period of ripening, and all those already formed would pass through the successive stages of development more or less completely. In this way there were eliminated several sources of error incidental to measuring the grain produced on a given area, such as the loss of grain in handling, and from incomplete threshing, varying productiveness of different plots of soil, etc. All broken kernels and foreign substances of every kind were removed, but no grains were removed in consequence of imperfect development. The grain was then poured into the scale-pan of a delicate balance, and ten grammes carefully weighed out and the number of grains of wheat counted. This was repeated ten times for each specimen and one-tenth of the sum of the whole was taken as representing the number of kernels of wheat for the weight of ten grammes.

The gross product of grain at the several stages of growth would be directly *as the weight of the kernels, and inversely as the number of kernels required* to produce a given weight.

The average number of grains of wheat required to weigh ten grammes at the several periods of cutting is given in the following table. I have also estimated the number of bushels of grain at the different periods of cutting, on the supposition that each variety of wheat produced thirty bushels to the acre as its maximum. The table also contains the percentage of nitrogen, cellulose, and ash, at the different periods of growth:

TABLE I.

Number of Cutting.	*Clawson.*		*Schumacher.*		*Clawson.*			*Schumacher.*		
	No. grains for 10 grammes.	Bushels to Acre.	No. grains for 10 grammes.	Bushels to Acre.	Nitrogen.	Cellulose.	Ash.	Nitrogen.	Cellulose.	Ash.
1	704	11:23	484	16.11	2.02	4.03	2.72	2.72	3.40	2.20
2	592	13.34	447	17.44	2.36	4.05	2.48	2.73	3.42	2.21
3	531	14.91	455	17.13	2.37	3.55	2.30	2.75	3.31	2.19
4	471	16.81	383	20.37	2.09	3.47	2.24	2.53	2.90	2.18
5	454	17.44	365	23.00	2.04	3.29	2.04	2.51	2.86	2.05
6	362	21.87	332	23.49	1.98	3.16	1.97	2.42	2.88	2.00
7	384	20.62	320	24.37	1.94	3.18	1.96	2.38	2.85	1.97
8	327	24.23	308	25.32	1.96	3.08	1.90	2.45	2.80	1.98
9	316	25.03	304	25.66	1.90	2.80	1.80	2.37	2.83	1.96
10	290	27.31	260	30.00	1.89	2.80	1.81	2.29	2.76	1.94
11	276	28.69	267	29.21	1.96	2.79	1.91	2.41	2.74	1.92
12	282	28.08	260	30.00	2.00	2.40	1.94	2.36	2.68	1.96
13	267	29.66	261	29.88	1.98	2.25	1.91	2.39	2.45	1.91
14	272	29.12	262	29.77	1.92	2.20	1.89	2.39	2.31	1.93
15	264	30.00	266	29.36	1.92	2.28	1.87	2.37	2.28	1.90
16	272	29.12	263	29.65	1.87	2.15	1.82	2.39	2.21	1.86
17	270	29.27	260	30.00	1.97	2.26	1.86	2.38	2.24	1.87
18	277	28.69	260	30.00	1.94	2.30	1.88	2.27	2.29	1.88
19	268	29.55	262	29.36	1.94	2.40	1.87	2.25	2.33	1.85
20	272	29.12	272	28.67	1.94	2.38	1.79	2.22	2.37	1.84
21	268	29.55	278	28.36	1.92	2.39	1.78	2.21	2.36	1.88

It will be seen that the Schumacher is about five days in advance of the Clawson: that the growth of each kind proceeds by a somewhat uneven progression, the increase of growth bearing some relation to the preceding daily temperature, because the specimens were gathered in the morning.

The falling off in the seventh cutting of Clawson is curious, and I can offer no explanation. After the complete ripening of the grain there is a sensible decrease, showing that the common impression among farmers that there is diminished production of grain when harvesting is delayed too long, is well founded. This loss is not from careless handling of the grain or from drying by over-ripening. The loss is a real one, though not large.

CHEMICAL ANALYSIS.

The wheat was powdered by prolonged beating in an iron mortar, and sifting this in a wire sieve of 38 meshes to the inch, and this process repeated till the entire quantity taken had passed through the sieve. The amount of water in each specimen was determined by prolonged heating in the steam bath and cooling in a sulphuric acid desiccator till there was no further loss of weights, and the entire loss of weight was taken as water. The results of all analyses and other estimations are based upon water-free material.

The ash was determined by prolonged burning in a shallow platinum dish, kept at a low red heat till the ash burned white, and the ash was weighed with its natural contents of carbonic acid. The percentage of ash is given in Table I, which shows a regular decline as the grain develops by formation of ash-free carbhydrates.

The cellulose was estimated by boiling in water containing 1¼ per cent sulphuric acid, then with water and repeating process; then with 1¼ per cent caustic potash solution—then boiling with water and washing the crude cellulose with alcohol and ether, following Hennebergh's method. The crude cellulose was then dried in water bath to constant weight; then incinerated and the weight of ash deducted, when the residual weight was taken as cellulose. No estimate was made of the small amount of nitrogen which it contained. The cellulose was of a light brown color.

The percentage of cellulose regularly decreased from the earliest formation of the grain up to the time of ripening, the amount being greater in the first cuttings of Clawson than in those of Schumacher, because of its more immature condition. After ripening there is an increase of cellulose, showing that over-ripening is attended by a loss of nutritive material, if we consider dense cellulose as indigestible. The increase of cellulose seems to be in intimate relation to the process of hardening exhibited in dead ripening.

The nitrogen was determined in the usual way by combustion with soda lime, and the amount of albuminoids estimated by multiplying the nitrogen by 6.4. The percentage of nitrogen is given in Table I, and the estimated amount of albuminoids in the dry substance is given in Table II.

TABLE II.

Number.	Per Cent Gluten. N×5.4=Gluten. Dry.		Water.		Acreage Products; Lbs. Albuminoids.		Acreage Products; Lbs. Carbhydrates.	
	Clawson.	Schumacher.	Clawson.	Schumacher.	Clawson.	Schumacher.	Clawson.	Schumacher.
1	16.77	17.40	9.81	12.81	118.00	168.10	515.32	544.28
2	15.10	17.41	10.98	11.97	120.86	182.18	627.27	805.31
3	15.16	17.60	11.13	12.76	135.62	180.86	707.65	790.41
4	13.37	16.19	11.32	12.69	134.85	197.87	805.60	962.24
5	13.05	16.06	11.83	15.44	136.56	221.63	854.07	1,091.61
6	12.67	15.49	11.26	13.74	166.25	218.63	1,078.64	1,122.00
7	12.41	15.23	10.85	12.06	153.54	221.78	1,020.37	1,169.95
8	12.54	15.68	10.46	11.90	180.30	238.21	1,201.10	1,208.37
9	12.16	15.42	10.83	14.93	182.62	237.40	1,239.20	1,230.46
10	12.09	14.55	11.66	11.64	198.11	262.90	1,364.95	1,452.50
11	12.54	15.17	12.41	12.04	215.86	255.87	1,434.63	1,312.79
12	12.80	15.10	13.53	11.54	215.65	272.79	1,306.03	1,443.53
13	12.67	15.29	13.50	11.52	225.47	274.02	1,480.10	1,340.62
14	12.28	15.30	12.62	17.77	214.56	273.11	1,461.18	1,435.30
15	12.28	15.17	14.51	12.62	221.04	265.72	1,504.66	1,412.60
16	11.90	15.29	13.53	12.14	209.31	272.00	1,469.10	1,434.60
17	12.80	15.10	15.54	12.44	224.79	272.80	1,459.01	1,453.22
18	12.44	14.52	13.71	11.99	213.62	263.72	1,434.70	1,461.58
19	12.41	14.40	12.58	12.17	220.00	260.15	1,479.07	1,464.61
20	12.41	14.20	12.85	12.05	216.83	244.27	1,458.51	1,393.51
21	12.28	14.14	12.40	12.86	217.72	239.76	1,471.35	1,376.30

By Table II. it will be seen that the highest percentage of albuminoids is formed in the earliest stages of growth, and it falls off regularly to the complete ripening of the seed, which contains relatively less albuminoids than at any previous period of growth. The claim that gluten is principally formed near the close of the process of ripening, and that the dead ripe wheat contains more gluten than wheat harvested at some earlier period of growth, receives no support from the results of these analyses.

The hard and flinty berry secured by over-ripening is no richer in gluten than the soft berry secured by early harvesting. I am now speaking of the percentage composition, and claim that a hundred pounds of early ripened wheat will contain a greater number of pounds of albuminoids than will a hundred pounds of the same wheat at a later period of ripening, when the accumulation of starch and other carbhydrates will have lowered the relative amount of albuminoids. But while the albuminoids are centessimally greater at early periods of growth, the acreage product increases with the growth of the crop up to a certain stage of ripening (when the grain crushes dry), and after this period there is no increase either relatively or absolutely. If the dead-ripe wheat is better for the miller than wheat cut at an earlier period, it is in consequence of the physical properties of the flinty berry, and not from any change in the chemical composition or increase of nutritive value.

CARBHYDRATES.

One significant change in the process of ripening was the rapid accumulation of starch. So rapid was the accumulation of the carbhydrates, that while the albuminoids increased in actual amount the increase of carbhydrates was so much more rapid that the percentage of albuminoids fell off continually up to the period of ripening, and when the storing up of starch was completed the ripening of the grain was also complete.

STRAW.

No effort was made to determine the food-value of the straw at the different periods of cutting. The grain so far outranks the straw in money value that the farmer is willing to sacrifice the straw, if thereby he may secure a corresponding increase of value in his grain; but the farmer is well aware of the rapid deterioration of the straw by allowing it to stand till the grain is dead-ripe, and if the dead-ripening is attended by no real increase of value in the grain, but an actual loss in the amount of grain, and the straw deteriorates greatly in the meanwhile, he may conclude that it is best to cut his grain as soon as ripe and thus save himself from needless loss.

In the hope of doing something toward placing agriculture upon a scientific basis, I offer this contribution to the chemistry of the ripening of wheat.

In making this investigation I have enjoyed the hearty and efficient coöperation of R. F. Kedzie, then my assistant in chemistry, and now Professor of Chemistry in the Agricultural and Mechanical College of Mississippi, who made all the analyses and otherwise assisted me in a most satisfactory manner.

TEMPERATURE OF SOIL AS MODIFIED BY CHEMICAL COMPOSITION.

ABSTRACT OF AN ARTICLE PUBLISHED IN THE REPORT OF THE STATE BOARD OF AGRICULTURE FOR 1868.

BY R. C. KEDZIE.

These experimental investigations consisted of a series of observations, by means of thermometers placed in the soils, and the observations taken thrice daily, from the first of May to the 30th of September. The soils used were tile clay taken from the subsoil; sand, such as is used for making mortar, and freed from all foreign matter, by washing; tile clay and 12 per cent. humus; sand and 12 per cent. humus; and humus. Each kind of soil was placed in a separate box; the several boxes being separated by hollow walls to prevent the lateral communication of heat. The thermometer bulbs were buried two inches deep in each soil, and the stems projected horizontally from the side of the box, so that the temperature could readily be read from the thermometer scale. The observations were taken at 7 A. M., 2 P. M., and 9 P. M. These observations and the results are contained in the following table:

SUMMARY OF RESULTS OF TRI-DAILY OBSERVATIONS ON SOIL TEMPERATURE FROM MAY TO OCTOBER, 1868.

	Average Temperature at		
	7 A. M.	2 P. M.	9 P. M.
Of Thermometer in open air	60°.29	76°.72	60°.01
Of Tile Clay from subsoil	59°.39	80°.07	64°.50
Of Tile Clay and 12 Per Ct. Humus	60°.52	80°.88	67°.52
Of Sand	60°.56	80°.41	64°.74
Of Sand and 12 Per Ct. Humus	60°.98	81°.61	69°.68
Of Humus, or Swamp Muck	60°.02	79°.93	68°.00
Average Daily Temperature of			
Thermometer in open air	65°.68	Over Air.	....
Clay	67°.99	2°.31	Over Clay,
Clay and 12 Per. Ct. Humus	69°.57	3°.89	1°.58
Sand	68°.33	2°.65	Over Sand,
Sand and 12 Per Ct. Humus	70°.96	5°.28	2°.63
Humus	69°.35	3°.67	....

The temperature at 2 P. M. is often excessive, and those combinations of soil would seem to be bost adapted to vegetable growth which maintain an elevated temperature at other portions of the day, e. g., at 7 A. M., and 9 P. M. Tried by this standard, we find that clay, mixed with 12 per cent. humus, has a temperature higher by 2°.08 than tile clay; aud sand, with 12 per cent. humus, has a temperature higher by 2°.68 than pure sand, and this relative excess of temperature is maintained through the whole season of active vegetable growth, viz., from 1st of May till 1st of October.

It will appear from this, that the farmer has an indirect control over the climate of his fields, through this relation of humus to temperature of soils, when mixed with them. The popular opinion in regard to muck is expressed in the epithet "frosty," so generally applied to it. One reason for regarding a mucky soil as predisposed to frost, probably arises from the position it usually occupies, viz., at the bottom of valleys, and other low positions. Into these valleys the air, rendered denser from a loss of temperature, will pour from all the surrounding high lands, and hence a lake of cold air will fill each valley, and a slight reduction of temperature by radiation will result in frost, and this frost is the result of position, and does not necessarily arise from the nature of the soil in such valley. Persons who travel in an open carriage at night in summer, and when the air is still, are aware how abrupt is the passage from comparatively warm air on the highlands to the cold air filling a valley, aud the equally abrupt change as they rise out of the valley into the warm air covering the opposite bank.

All of which is respectfully submitted.

R. C. KEDZIE.

LANSING, December, 1868.

AGRICULTURAL COLLEGE BULLETINS.

[The law providing for the publication of these bulletins (Act No. 81, 1885), is printed on page 47 of this Report. Bulletins Nos. 1 to 6 were printed in the Report of 1884. Any one wishing to have these bulletins regularly mailed to them as issued will please send their name and address to the Secretary of the State Board of Agriculture, Agricultural College, Mich.]

NO. 7.—DEPARTMENT OF HORTICULTURE AND LANDSCAPE GARDENING.

I. Notes on Fruits.
II. Notes on Vegetables.
III. Notes on Some Hardy and Desirable Ornamental Trees and Shrubs.

As my connection with the college dates from last January only, it will be impossible for me to prepare a bulletin which shall be the result of especial investigation or experiment. Aside from the notes upon hardy ornamental trees and shrubs, therefore, I shall attempt little more than an enumeration of the experiments which we have inaugurated for the testing of new varieties of fruits and vegetables, with catalogues of the varieties we are growing at present. It will be to the interest of many to know what fruits are growing upon the college premises. It is intended to test all promising new varieties as fast as they appear. We solicit new varieties from parties who originate them, desiring, especially, to secure them before they are put upon the market. A fruit garden of four acres is being fitted for the growth of small fruits. Unfortunately, our climate is a rigorous one, and none of the tenderer fruits can be grown.

It is hoped to soon inaugurate other experiments of more general value, of wider application than the mere testing of varieties, but not to such an extent as to interfere with those in hand. In order to make an exact record of the whole visible biography of all our cultivated plants from sowing to maturity, arrangements have been made for competent observers—one for the fruit garden and orchards, one for the vineyards, and one for the vegetable garden—to make daily notes throughout the season upon conditions of plants and important phenomena of growth and structure. This arrangement will enable us to present in systematic tabulated form the seasons of germination and maturity, the period of the plant's greatest and least vigor, the exact external influences of culture and weather, the detailed charac-

teristics of leaves, flowers, and fruits, and many other highly important features of experiment.

I.—NOTES ON FRUITS.

As our gardens must always be maintained largely for purposes of illustration, it is necessary to retain certain instructive, interesting, or historical varieties which are no longer of use to the farmer or gardener.

STRAWBERRIES.

All the strawberries enumerated in the following list were set during last August and early September. Other varieties will be set next spring. In order to test the effects of soils upon the character of varieties, plants of many sorts and from the same sources have been set upon widely different soils, upon those ranging in character from light sand to heavy clay loam. Upon these dissimilar soils the plants will be given the same culture.

Alpine Wood.
Atlantic.
Belle Bordelaise.
Bidwell.
Captain Jack.
Cinderella.
Crescent.
Crystal City.
Cumberland.
Daniel Boone.
Downing.
Finch's Prolific.
Glendale.
Green's Prolific.
Henderson.
James Vick.
Jersey Queen.
Jewell.
Jucunda.
Kentucky.
Longfellow Improved.
Lord (*Vineland*).
Lower.
Manchester.
Marvin.
Miner's Prolific.
Mrs. Garfield.
Monarch of the West.
Mt. Vernon.
Nigh's Superb.
Old Iron Clad.
Ontario.
Parry.
Pioneer (*King of the North*).
Piper.
Prince of Berries.
Royal Hautbois.
Seth Boyden.
Sharpless.
Sucker State.
Triomphe de Gand.
Wilson.
Windsor Chief.
Woodruff No. 1.
Woodruff No. 2.

Also Benjamin Hathaway's No. 5, and a seedling from Ohio, said to have been reared from seeds of Big Bob, sent under the name of "Big Bob's Baby."

The following brief notes, which I made this year upon strawberries grown here and in this vicinity, mostly upon light soils, and with indifferent culture in matted rows, are selected from a recent correspondence to the *Country Gentleman:*

Atlantic:—Very late and enormous in size; flavor rich and musky; color extra good, very dark. It promises well.

Bidwell :—With us this is one of the finest berries. Were it not for the characteristic green tip it would possess scarcely a fault. I think that it will succeed best in hill culture.

Cinderella :—A good early berry, coming in with the Crescent. Fruit attractive. Plant vigorous.

Crescent :—For all purposes, perhaps, the best of the older berries. In dry weather it runs too small. I know of no berry which does better upon all soils, and under all kinds of cultivation.

Crystal City :—The earliest berry I have seen. Quality high. It is not productive, and, aside from its earliness, is not to be recommended. It demands a light, warm soil.

Cumberland :—An excellent berry for home use, perhaps the best of the well-known sorts for this locality. Too soft for market.

Daniel Boone :—One of the most promising of the new sorts. The color is excellent, very dark and rich. Size medium, uniform. It may prove too soft for a market berry.

Finch's Prolific :—Much like the Manchester, but the fruit stands up better and is later. It is not so late as the Mt. Vernon. A good berry, but in no way superior to many other sorts.

Glendale :—A firm and late berry, but quality poor. Calyx very large, separating readily from the berry. Gives evidence of excellent market qualities.

Jersey Queen :—Of ordinary promise. Flavor very pleasant, but not rich.

Kentucky :—All things considered, the best late berry I know, but it is only moderately productive.

Lord (Vineland):—Much like the Kentucky, but lacks the point of that berry. Promises nothing extraordinary here.

Lower :—A berry which originated at Mt. Pleasant, Mich., and which has been grown here for three or four years. Productive, and of high quality. Size good and uniform. Excellent for home use, but too soft for shipping by rail.

Manchester :—Ripens remarkably even. Color most too light, and the berries are borne too near the ground. A most excellent berry, however, and especially valuable for its uniformity in size and coloring.

Mrs. Garfield :—Does not appear to be productive, and the quality is not high. Needs to be further tested.

Mt. Vernon :—To be recommended for its lateness, but is too soft for shipping. The core pulls out very easily. The fruit stands up well. A productive and beautiful berry for home use.

Miner's Prolific :—A wonderful berry as grown here on rich soil and with good culture; productive, large, firm, quality good. It equaled the Sharpless in size. During the first two or three pickings the berries had green tips similar to the Bidwell, but these colored up well as the main pickings began.

Piper :—Plants large and vigorous, but not very productive. Fruit borne too close to the ground.

Prouty :—A failure.

Vick :—Very productive, in fact, it is over productive, and for this reason the fruit is too small. The "seeds" are borne conspicuously on the surface, giving the berry a "seedy" appearance. I am disappointed in the Vick this year.

RASPBERRIES.

Brandywine.
Caroline.
Cuthbert.
Hansell.
Henrietta.
Highland Hardy.
Gregg.
Marlboro.
Nemaha.
Ohio Everbearing.
Rancocas.
Reeder.
Shaffer's.
Souhegan.
Turner.

BLACKBERRIES.

Agawam.
Ancient Britain.
Kittatiny.
Minnewaski.*
Snyder.
Stone's Hardy.
Taylor.
Wachusett.
Wilson Jr.
White,—propagated from wild plants.

CURRANTS.

Black Naples.
Cherry.
Fay's Prolific.
La Versaillaise.
Prince Albert.
Red Dutch.
Victoria.
White Dutch.
White Grape.
Wilder.

GOOSEBERRIES.

Downing.
Houghton.
Industry.
Pale Red.
Smith's Improved.

GRAPES.

The following note which I communicated to the Philadelphia *Press*, last spring, may possess some value:—

"During last winter the thermometer recorded temperatures ranging from 25° to 32° below zero, and we had an opportunity to observe the hardiness of the different varieties of grapes in the college vineyard. The vines were pruned in the fall. Here are some transcriptions from my note-book: Barry, Brant, and Goethe, uninjured; Worden in most cases unscathed; Concord canes are killed back half their length, but the young shoots are strong. Cottage, Merrimac, and Black Hawk, very slightly injured. Agawam (Rogers 15), cut back a little, but new shoots very vigorous. Rebecca and Rogers 5 partially killed. Ives, Massasoit, Perkins, Martha, Norton's Virginia, Lady, and Haskell's Hybrids, Nos. 36, 340, 324, 343, and 348 killed to the ground. Champion, Wilder (Rogers 4) Taylor's Bullit, and Creveling nearly as bad. Clinton canes killed back a foot or two, Hartford half their length, Delaware ditto, and Seneca cut at the tips but vines vigorous. Isabella vines are all injured and often killed to the root. Many of the tenderer vines, like Creveling and Norton's Virginia, which had been laid down, came through unscathed and are pushing new shoots with great vigor."

I also transcribe a few notes made September 28, 1885, upon mildew. The American grape mildew, *Peronospora viticola*, attacks the under surface of the leaf, where it may be detected in the form of little frost-like patches. If the fungus is generally distributed over the under surface, the upper surface will show the disorder by its yellow color and the final browning and death of the leaf. This mildew must not be confounded with the fuzzy whiteness on the leaves of many varieties. The mildew is in patches, and is peculiarly frost-like, while the natural whiteness is continuous and made up of cob-webby threads. The varieties which have suffered most from mildew are as follows: Delaware, very much injured, the leaves unhealthy all the season and falling off by the middle of September, or before. Next in order come Merrimac, Rogers' 5, Agawam, Salem, Poughkeepsie Red, Empire State, Alvey, Owosso, Walter and Haskell's Nos. 64, 75, 229, 224, 122, 188, 136, 366, 420. Haskell's Nos. 122 and 136 are the fuzziest leaves which I have known to be much attacked by mildew. The varieties injured to some extent, not seriously, are Herbert, Isabella, Telegraph on young leaves, Haskell's Nos. 128, 309, and 387. Brighton has some mildew, but the vines not injured; same with Seneca. Goethe shed its leaves very early, but the cause does not appear to be mildew entirely. The leaves of Haskell's Nos. 224 and 229 are very poor and small at best. The varities which withstood mildew best are Concord, Worden, Champion, Woodruff Red, Niagara, Hayes, Ulster Prolific, and Haskell's Nos. 325, 12, 317, and 33. The foliage of the Woodruff Red is remarkably thick and vigorous; also Haskell's Nos. 12 and 317.

We fruited Ulster Prolific this year. It is like the Delaware in color, but larger, firmer, and fully its equal in flavor. Its leaves are rather small, but very firm and vigorous. It gives much promise.

We have three vineyards, comprising about 850 plants.

The following is our catalogue of grapes and sundry fruits:

Adirondac.
Agawam.
Alvey.
American Muscadine.
Barry.
Black Eagle.
Black Hawk.
Brant.
Brighton.
Cambridge.
Challenge.
Champion (*Tallman*).
Clinton.
Concord.
Conqueror.
Cottage.
Creveling.
Cuyahoga.
Delaware.
Diana.
Iona.
Isabella.
Ives.
Janesville.
Jane Wylie.
Lady.
Martha.
Mary Ann.
Massasoit.
Maxatawney.
Merrimac.
Moore's Early.
Niagara.
North Carolina.
Norton's Virginia.
Owosso.
Perkins.
Peter Wylie.
Pocklington.
Poughkeepsie Red.

* A variety not yet put upon the market, being tested for the originators; A. J. Caywood & Son,

Dracut Amber.
Duchess.
Elsinburg.
Elvira.
Empire State.
Goethe.
Hartford.
Haskell's Seedlings, Nos. 2, 19, 35, 36, 58, 64, 75, 95, 118, 122, 128, 136, 169, 184, 188, 224, 229, 230, 267, 287, 295, 300, 306, 309, 324, 334, 340, 342, 343, 348, 366, 371, 398, 418, 420.
Hayes.
Herbert (*Rogers' No. 44*).
Prentiss.
Rebecca.
Rogers' No. 5.
Salem.
Seneca.
Taylor's Bullit.
Telegraph.
To-Kalon.
Ulster Prolific.
Walter.
Wilder.
Wilmington Red (*Wyoming Red*).
Woodruff Red.
Worden.

Also a variety of seedlings.

QUINCES.

Apple (*Orange*).
Meech's Prolific.

CHERRIES.

Belle de Choisy.
Black Heart.
Carnation.
Governor Wood.
May Duke.
Morello.
Yellow Spanish.
Windsor.
Also a variety of seedlings.

PLUMS.

Jefferson.
Lombard.
Mariana.
Reine Hortense.
Smith's Orleans.
Washington.
Wild Goose.

PEARS.

Bartlett.
Belle Lucrative.
Beurre Bosc.
Beurre d'Anjou.
Beurre Giffard.
Beurre Gris d'Hiver.
Beurre Hardy.
Beurre Superfin.
Bloodgood.
Brandywine.
Buffum.
Clapp's Favorite.
Daimyo.
Doyenne Boussock.
Doyenne d'Ete.
Flemish Beauty.
Gray Doyenne.
Howell.
Kieffer.
Lawrence.
Lawson (*Comet*).
Le Conte.
Louise Bonne de Jersey.
Madeleine.
Madam Von Siebold.
Mikado.
Napoleon.
Onondaga.
Osband's Summer.
Rostiezer.
Seckel.
Sheldon.
Tyson.
Urbaniste.
White Doyenne.
Winter Nelis.

About 150 trees.

APPLES.

Baldwin.
Ben Davis.
Benoni.
Chicago.
Early Harvest.
Early Strawberry.
Fall Jennetting.
Fall Pippin.
Fameuse.
Garden Royal.
Gravenstein.
Grimes' Golden.
Golden Sweet.
Hall.
Hawley.
Herford.
Hurlbut.
Jersey Sweet.
King.
Late Strawberry.
Maiden's Blush.
Melon.
Northern Spy.
Ohio Nonpariel.
Pennock.
Pomme Grise.
Porter.
Primate.
Red Astrachan.
Red Beitigheimer.
Red Canada.
Red June.
Rhode Island Greening.
Ribston Pippin.
Roxbury Russet.
Swaar.
Sweet Bough.
Sweet Romanite.
Summer Rose.
Talman's Sweet.
Titovka.
Twenty Ounce.
Wagener.
Warfield.
Wealthy.
Williams' Favorite.
Yellow Bellefleur.
Yellow Transparent.

About 300 trees.

CRAB APPLES.

Blushing Maid.
Gen. Grant.
Marengo.
Transcendent.
Whitney.

MISCELLANEOUS FRUITS.

Russian Apricot, Prunus Sibirica.
Prunus Pissardi.
Prunus Simoni.
Sand Cherry, Prunus pumila.
Wild Plum, Prunus Americana.
Dewberry, Rubus Canadensis.
Barberry.
White Mulberry, Morus alba.
Black Mulberry, Morus nigra.
Spanish Mulberry, Morus Hispanica.
Japanese Mulberry, Morus Tokwa.
Langdon's Mulberry.
Downing's Mulberry.
Wild Mulberry, Morus rubra.
And various seedlings of wild fruits.

II.—NOTES ON VEGETABLES.

The vegetable garden is nearly seven acres in extent. It is maintained for the purpose of furnishing illustrative labor to students, and supplying the college tables with vegetables. It is intended also that new varieties of vegetables shall be tested, although there has been little attempt in this direction this year. The season has been one of cool nights. Melons on heavy soils have not ripened. In most cases there has been an undue growth of plant at the expense of fruitfulness. Beans appear to be a light crop

throughout the country. The most satisfactory test was in the case of a new sweet corn, Ballard's Early, which was compared during the season with the Early Minnesota. Both were grown on the same soil, side by side, and were given the same culture. Early Minnesota was planted May 22, and picked first August 7. Ballard's Early was planted June 2, and picked first August 1, being over two weeks earlier than the Early Minnesota. The ears are as large as that variety, more uniform, and the quality is certainly superior. This sweet corn has been bred up by Mr. A. Ballard, of North Lansing, Mich.

We grew the following early peas: Ferry's First and Best, Bliss' American Wonder, Prince of Wales, Maule's Earliest of All, Carter's Stratagem. The most desirable of these for earliness and productiveness was Ferry's First and Best. Maule's Earliest of All appeared to differ from it only in diminished productiveness.

Our best lettuce, as to tenderness and flavor, was Finch's Perfection, although Ferry's Prize Head was little inferior. Our poorest lettuce was the Oak-leaved.

Maule's Sure-head cabbage is remarkably vigorous, but the heads are soft.

The Giant Rocca onion is very uneven in size owing to lack of maturity in this climate. The flavor is mild and pleasant. For market, a failure here.

III.—NOTES ON SOME HARDY AND DESIRABLE ORNAMENTAL TREES AND SHRUBS.

The climate of Lansing appears to be uncommonly severe for this latitude (43° nearly) in Michigan. Last winter the mercury sank to —32°, and many times in quick succession it was below —20°. That, however, was an unusually rigorous winter. Moreover, the college campus lies in an open and exposed country, and the winter winds are very destructive. It is only the hardiest plants which can endure long, and the following list, although including few elegant plants and no novelties, must be useful to those who would ornament in cold climates. The plants here mentioned have been set and trained by my predecessors, chiefly by Dr. Beal, who has also published occasional notes in regard to many of them.

EVERGREENS.

The *Norway Spruce* is, of course, the leading evergreen for this climate. It varies much, some of the weeping forms being especially attractive.

The *Arbor Vitæ* must be placed second on the list. It is always hardy and easy of cultivation. Its leading fault is its yellow color in winter. With age and increased fruitfulness it often assumes a straggling and uncomely aspect. The so-called *Siberian Arbor Vitæ* is the best of the named sorts which have been tried here. Its especial value lies in its very compact and rotund form, and in the bright green of its winter color. The varieties known as *ericoides, globosa, Hoveyi,* and *pyramidalis* are hardy and desirable. The last is especially desirable for small and neat enclosures. The *Chinese Arbor Vitæ* has not proved hardy.

I should give the white spruce, *Abies alba,* the third place among evergreens. As compared with the Norway spruce, it is much more refined, a slower grower, more dense and regular in outline, and lighter in color.

The *Hemlock Spruce* is perhaps the most graceful of evergreens; but, although native to higher latitudes than this, it is not entirely hardy in exposed situations here. It suffers from scorching suns and winds rather than from low temperature. When planted behind sheltering groups of trees they appear to attain their highest excellence.

The Oriental Spruce, *Abies orientalis*, is an elegant tree, but was severely injured last winter. It is recovering, however. Once before our specimen had the same experience. This spruce excels in the perfection and enduring greenness of its lower limbs.

Two *Retinosporas*, *R. squarrosa*, and *R. pisifera* are hardy.

Juniperus Sabina var. *procumbens*, the native Savin Juniper, is hardy and attractive. It is probably our best procumbent evergreen for small places. The Irish Juniper, *J. communis*, var. *Hibernica*, is unique, formal, and comely. Occasionally it has been somewhat injured by winter. The Swedish Juniper, *J. communis* var. *Suecica*, is more hardy, but not so attractive.

Of the *Pines*, *Pinus Cembra*, the Cembrian Pine is the prettiest. It closely resembles a small and shapely white pine. A slow grower; very hardy. This and the gray or scrub pine of northern Michigan, *Pinus Banksiana*, are the only upright growing sorts suitable for planting near dwellings. The scrub pine takes well to cultivation, and is neat and graceful in habit. I suspect, however, that old specimens will exhibit too much of a straggling habit. *Pinus resinosa*, the red or Norway pine, is growing upon the grounds, but is yet too young to exhibit character. Three other pines are in common cultivation, and in regard to general desirability they should stand in the order named, in my estimation: *Native White Pine, Scotch Pine, Austrian Pine.* The dwarf or straggling pine of Europe, *Pinus pumilio*, is always hardy and desirable for rough and rocky places.

The *Balsam Fir* and native *Black Spruce* are attractive while young, but they lose their beauty in ten or fifteen years. The common red cedar, *Juniperus Virginiana*, if well grown is a graceful tree when young, but it loses its beauty with age.

DECIDUOUS SHRUBS AND VINES.

The *Imperial Cut-leaved Alder* is hardy. The thinness of its tops gives the plant an appearance of poverty, however, and the persistent old cones are unsightly.

The wild climbing bittersweet or wax-work, *Celastrus scandens*, is desirable for a rear building or rough object. A very pretty covering for a tree-trunk is a mixed festoon of bittersweet and Virginia Creeper. The contrasts in autumn coloring of foliage and berries are striking. The *Virginia Creeper* is still our popular climber. Some individuals do not climb well. Dr. Beal propagated two plants from one parent, but they are quite dissimilar in habits of clinging to a building. The *Japanese Ampelopsis* will probably prove hardy when once established. The *Chinese Wistaria* is not hardy.

The ordinary choke cherry, *Prunus Virginiana*, is one of our most beautiful shrubs; so also is the common flowering dogwood, *Cornus florida*. The flower buds of the dogwood were killed last winter, however.

The smoke tree, *Rhus Cotinus*, both the white and purple sorts, are always desirable.

The common wild dwarf sumach, *Rhus copallina*, is one of the very best small shrubs for autumn coloring.

The wild crab, *Pyrus coronaria,* is very attractive when in flower. It should find a place in the shrubbery.

The Fringe, *Chionanthus Virginica,* is hardy. The English hawthorn, *Cratægus oxyacantha,* has not been hardy.

Our three lilacs, the common, *Syringa vulgaris,* Persian, *S. Persica,* and the Josika, *S Josikæa,* are hardy and satisfactory. The latter is to be recommended because it blossoms three or four weeks later than the other sorts.

Tamarix Gallica, Tamarisk, was injured last winter. Hitherto it had stood well.

The chaste little *Deutzia gracilis,* with some protection of leaves, is very desirable.

From *Spiræa triloba* we get our most profuse white flowers.

Attempts at *Rhododendron* culture have so far proved unsatisfactory.

Double-flowering Almond was injured last winter.

The Mock Orange, *Philadelphus coronarius,* is always hardy.

The Rose Acacia, *Robina hispida,* is hardy and very attractive.

The Missouri or Buffalo Currant, *Ribes aureum,* is hardy and popular. It is often sold by nurserymen under the name of Ribes fragrans.

The *Japanese Quince* is not hardy.

Hercules Club, *Aralia spinosa,* although hardy, is scarcely desirable as an ornamental plant.

DECIDUOUS TREES.

The *American Elm* is certainly queen of the American landscape.

The *Red* or *Slippery Elm* is too stiff and straggling for ornament.

The *Cork Elm* is a curiosity, very picturesque, but never beautiful unless in the soft aspect of its leaves. These three native elms are readily distinguished as follows:

Red elm—buds globular, hairy; leaves very rough. American elm—buds long, not sharp; top diffusely branching; branches slender, drooping. Cork elm—buds long, very sharp; trunk usually continuous through the top; branches mostly horizontal; young branches bearing corky ridges of bark. The English elm, *Ulmus campestris,* is not desirable; in fact, it is not perfectly hardy.

The *Maples* are desirable in the following order: *Norway Maple* (Acer plantanoides), *Black* (a variety of the hard maple), *Hard or Sugar Maple, Silver Maple, Red or Swamp Maple, Sycamore Maple,* of Europe (A. Pseudoplatanus), *Field Maple,* of Europe (A. campestre). *Wier's cut-leaved Maple,* a form of the Silver Maple, is the best horticultural variety we have tried. The Sycamore Maple was injured somewhat by the last winter, but it has now nearly recovered. Acer campestre is not hardy.

The best of the Oaks for ornamental purposes is the Swamp White Oak, *Quercus bicolor.* This is followed by the *Burr Oak,* a highly picturesque tree, and the Chestnut Oak, *Quercus Primus.* The *White Oak* ranks next, followed by the *Black Oak* (Quercus tinctoria), *Scarlet Oak,* and *Red Oak.* The *English Oak* does not appear to be hardy.

The best of our ashes for ornamental purposes is the *Black Ash.* When the tree is given plenty of room it forms a symmetrical and very graceful top.

The *Wisconsin Weeping Willow* (evidently a variety of the old Salix Babylonica) is perfectly hardy. The ordinary *Weeping Willow* is not hardy.

The *Cut-leaved Weeping Birch* is always desirable.

The *Horse Chestnut* is hardy upon heavy clay soil, but it has always winter killed upon our light sands.

The two *Catalpas, C. speciosa* and *C. bignonioides*, are about equally hardy. Both suffer considerably, and appear to be unreliable. As Catalpa speciosa has not been recognised as distinct from the older species until quite recently, the leading distinctions between the two may be given: C. speciosa—tree tall, a straight grower; leaves softly downy, inodorus; flowers two inches across, nearly white, the lower lobe notched; pods stout and long (1½ inch in circumference). C. bignonioides—tree lower, diffuse in growth; leaves smooth, or nearly so, giving a disagreeable odor when touched; flowers smaller, dingy, the lower lip entire; pods more slender. *Teas' Japan Hybrid Catalpa* is not hardy.

The Cucumber tree, *Magnolia accuminata*, was injured nearly every winter until eight or nine years old. It endured the last winter better, although the highest shoots were killed. Others of the Magnolias, although not hardy, are desirable for the great annual shoots which have a tropical appearance.

The *Lombardy Poplar* is short lived in this climate.

Yellow-wood, *Cladrastis tinctoria*, is always desirable; very beautiful when it comes into flowering.

The Bald Cypress, *Taxodium distichum*, suffered last winter for the first time.

The Ginkgo, *Ginkgo* (Salisburia) *adiantifolia*, is perfectly hardy.

The following are among the new ornamental plants set last spring:

Rhododendron Catawbiense and vars.
Purple Beech.
Cut-leaved Weeping Beech.
Wheatley's English Elm.
Halesia Tertraptera.
Japanese Maple.
Paulownia Imperialis.
European Basswood.
Weeping European Basswood.
Deutzia Crenata.
Lonicera Fragrantissima.
Sambucus Nigra.
Dutchman's Pipe (*Aristolochia Sipho*).
Quercus Robur Forma Nigricans.
Double-flowering Apple.
Double-flowering Cherry.
Silver-leaved Pear.
Medlar (*Pyrus Germanica*).
Crataegus Douglasii.
Pyrus Hybrida.
Pyrus Domestica.
Pyrus Halleana.
Russian Mulberry.
Retinospora Decussata.
Sciadopitys Verticillata.
Picea Pungens.

L. H. BAILEY, Jr.,
Oct. 1, 1885. *Professor of Horticulture and Landscape Gardening.*

No. 8.—WINTERING BEES.

The importance of bee culture, as one of our national industries, is hardly appreciated. According to our well demonstrated modern philosophy, plants pour out their nectar as a sort of free coffee or lunch, to attract bees and other insects to a most important work in vegetable economy, the work of fertilization, which largely depends upon insects, and without which full fruitage is impos-

sible. The simple work of gathering nectar then is indirectly of tremendous economic importance to the farmer and horticulturist, and so to our whole country.

Again, this nectar, when acted upon by the digestive juices of the bee, is converted into honey, a food long valued for its superior excellence, which, without bees, would be wholly lost; worse than lost, as we see from the fact stated above.

Bees, from their exceeding number and peculiar fitness for the work, are greatly superior to any and all other insects in the accomplishment of this fertilization of plants, while only the honey bees are abundant early in the season, and they alone save this valuable food element to minister to man's good.

To show the activity of bees and their wondrous accomplishments, we have only to present well-known facts. I find, by actual observation, that single flowers are sometimes visited by bees fifty times a day, and I have seen bees visit over twenty flowers a minute.

Mr. L. C. Root, of Mohawk, New York, (see American Apiculturist, Vol. III., p. 197), extracted 4,103 pounds of honey on July 28, 1885, collected from basswood, which had all been gathered by forty colonies of bees in just seven days. This is over 100 pounds per colony, and the daily stores of each colony exceeded fourteen pounds During the same time we secured, here at the college, nearly half as much beautiful comb honey from single colonies.

I know of a farmer in this State,—a good farmer, with a farm of over 100 acres which he tills excellently well—who has kept bees six or seven years, and who, for the last three years, has had from sixty to eighty colonies; the cash receipts from these bees, during each of the last three years, exceeded those of the entire balance of his farm. During all these years this gentleman has never lost a colony of bees, till last winter, when one or two died of starvation. The same experience would be true of any farmer in almost any Michigan neighborhood, who would put the same thought, study, and energy into the business.

WINTER LOSSES.

The one great drawback in this industry is the danger of loss which comes with each of our severe winters, which are unpleasantly frequent of late. Last winter was one of the most severe. Judging from the experience of the last twenty years, these terribly cold winters may be expected about once in three years. If we may judge from the past, we may also safely assert that during these most trying winters there will be a loss of from fifty to one hundred per cent of the colonies of bees in all the northern States. Such a loss as this, unless it can be prevented with ease and certainty, is too serious an obstacle in the way of success to be cheerfully endured, even by those in the most attractive and remunerative of employments and it is greatly to the praise of apiculture that, burdened with this loss, it has made such constant and rapid progress.

ARE SUCH LOSSES NECESSARY?

The fact that so many apiarists, like the one referred to above, meet with no loss, makes it clear that, with full knowledge, followed by equal care and pains, this loss may be wholly prevented. Many of our best bee-keepers have no more fear of losing their bees than of losing their cattle and horses. We, at the college, have met no such loss for years.

POINTS TO BE CONSIDERED.

Bees are natives of a warm climate, which would lead to the conclusion that in rigorous climates they would need protection, especially at times of great cold. The fact that winter losses are never heard of in California and the south strengthens the argument, which seems almost demonstrated by the fact that our losses in the north always occur in winters of great and long continued cold.

Again, bees are very neat, and in confinement hold their fecal excreta, or try to, till they can fly. If kept very quiet, they eat very little—we have had single colonies of bees pass four and five months in the cellar without consuming more than four or five lbs. of honey—and the food they do eat when thus quiet is largely, if not wholly, of honey, and so there is very little waste. Thus, when quiet, bees need not fly to discharge their feces and so bear confinement for months with no harm. The best condition to maintain this needed quiet is uniform temperature, which experience has demonstrated should be about 45° F. I prefer the temperature about the hive to be kept at from 40° F. to 45° F. In a surrounding temperature much higher or lower, the bees are disturbed, exercise much, eat more and become diarrhetic.

From years of experience and observation, it seems pretty well demonstrated that with enough good, wholesome food—30 lbs. of good honey or cane sugar syrup—and a uniform temperature as suggested above, our bees will winter invariably without loss.

DAMPNESS AND VENTILATION.

It would seem that a damp atmosphere, which, as we all know, is favorable to the growth and development of fungi, and inimical to health in higher animals, would be harmful to bees. It has been found, however, that in many cases, even during terribly disastrous winters like the past one, bees have wintered remarkably well in very damp cellars. Thus while we may presume that a very damp atmosphere is not the best, yet we may safely assert, other things being all favorable, that it of itself will not carry the seeds of mortality with it.

Ventilation has also been much discussed, and various theories have been offered. Yet the physiologist, and especially the physio-entomologist, will not be easily persuaded that insects whose functional activity is so slight, that a minimum of food supplies their wants stand in need of much air. One year at the college I sealed a large colony of bees with ice frozen solid at the entrance of the hive, and yet the colony wintered exceptionally well. This colony remained for more than three months entombed in a snow bank. As the hive was glued or propolized at the top we can see that the ventilation was slight indeed. Thus physiology and experience both show that under the best conditions litle heed need be given to ventilation. While bees do not hibernate in the sense of becoming totally inactive, yet they may and should have their vital activity kept at the minimum else they will need air and quite ample ventilation. As we have already seen, cold or heat—that is a temperature much below or above 45° F.—arouses bees, excites nutrition, and of course would necessitate more food and oxygen, and so more ventilation. Unless we can keep the bees then in just the condition to enforce quiet, we must arrange for ample ventilation.

It goes without saying, that the temperature inside a hive, in which bees are wintering, must generally be warmer than that outside the same. The fact

that bees do not hibernate establishes this truth. The thermometer confirms it. We know that moisture is sure to collect on a cool surface; but water dripping upon bees can not be healthful. The disturbance and the wetting would both be injurious. To winter bees then with the most success needs a covering that is not a good conductor of heat. Experiments on quite an extended scale have shown me that this is not all theory.

We see then that the requisites to success in wintering bees are: enough good food, uniform temperature without the hives at about 45° F., slight ventilation, and a cover to the hive which is a non-conductor of heat.

METHODS THAT HAVE SECURED SUCCESS.

Food.

The food may be either honey or cane-sugar syrup. Any kind of honey, if wholesome and pleasant to the taste, will answer. Even last winter the bees at the college were wintered wholly on honey gathered in autumn, after the 25th of August, and all wintered well and there was no sign of diarrhœa, except in a few cases were much pollen was left in the hives. Cane-sugar syrup is quite as good, possibly superior to honey at times, as we can be certain that the syrup is free from deleterious elements. The syrup for winter food may be as condensed as possible, and yet it must not crystallize when cold. One-half to one-third as much water as sugar by weight is about right. A little honey added will also retard crystallization. A little tartaric acid is often used for the same purpose. It is best to feed quite early so all may be stored and capped before winter's cold prevents further labor in the hive. Bees should never be put into winter quarters with less than thirty pounds of food, which will always suffice from September till the harvest of the following summer.

Important Suggestions.

It is well to have all colonies reasonably strong in autumn, and soon after the first hard frost give each colony as few combs as possible and secure the requisite amount of honey. I prefer to use about six Gallup or Langstroth frames, and by use of division boards, crowd the bees; then I cover warmly with burlap sacks of fine, dry saw-dust. This costs but little, and aids greatly to preserve the vital strength of the bees during the cold days of October and November and early the next season.

Uniform Temperature.

This is best and most cheaply secured by use of a good, dry (?), dark cellar. As a cellar is entirely or nearly all beneath the surface of the earth, it remains unaffected by the severest cold of winter or the more genial warmth of spring. The great requisite is that the temperature shall never go below 38° F., even during the most severe weather of our most rigorous winters, nor above 47° F. A good underground cellar will secure the former, but when many bees are put into our cellars, it is not always so easy to secure against too great heat. There are two ways to accomplish this: First, by use of water in the cellar, and, second, by means of underground or sub-earth ventilation. When a running stream from springs can be secured, it forms the most desirable moderating agency I know of. Such water is just about the proper temperature, and while it modifies against heat or cold, it also serves beautifully to dissolve impurities and sweeten the atmosphere. In lieu of such a spring or running water (under-

ground tile are constantly carrying water into and out of our college bee cellar) a good cistern answers well. The water in this is regulated by the usual temperature of the cellar, which is about that of the earth, and so in times of extreme cold or too great warmth protects the cellar against change. I know of such a bee cellar that passed the coldest weather of last winter with an east window constantly open,and yet the temperature was maintained at the desired, point. Such an amount of latent heat stored up in a cellar cistern is a great safeguard, and is especially valuable when a great number of bees are placed in a cellar. Each colony generates some heat, and with a multitude, the heat, especially during a protracted warm spell in winter or spring, is apt to become ruinously excessive. Sub-earth ventilation secures this moderating agency in air which comes to the cellar, cooled or heated by a long transit through an earth pipe, *which runs many yards through the earth beneath the influence of the* outside temperature. To secure the necessary exchange of air and certain influx of the tempering atmosphere, a small sized stove-pipe connects from near the bottom of the cellar with a stove-pipe, preferably, of the kitchen stove above. This small pipe has its lower end open, while above it connects with the kitchen stove-pipe some distance above the stove, else the stove will not draw well, and will trouble from smoking. A second pipe of four or six inch tile also passes from the bottom of the cellar through the wall and thence beneath the frost line for one or two hundred feet through the earth, when it should come to the surface and the end be protected against vermin by use of a wire screen. We can easily see that whenever the kitchen stove is used—daily—the air is drawn from the cellar and the out-door air warmed in winter and cooled in spring and summer is drawn through the tempering soil into the cellar. I have known of this arrangement being tried in many cases, and always with the best results. If it is feared that water may enter the cellar through the sub-earth pipe the joints may be sealed by use of cement, or arrangements made to drain at the lowest point. This arrangement not only protects against extremes of temperature, but it serves ever to keep the cellar sweet. Mr. D. A. Jones of Canada, builds above ground, when it becomes necessary to have his building double-walled, with a 30-inch space filled in with saw-dust, not only on the sides but above as well. Others dig a pit in a side hill. These methods are only inferior to a cellar in that they are more difficult to regulate. Mr. Jones not only has the sub-earth arrangement but he is forced to provide ice boxes in the warm days of spring in order to protect against too great warmth. In all these cases, good, close double doors should be made, and the rooms should surely be mouse tight.

Packing.

Many bee keepers have succeeded well by packing. Southard and Ranney, of Kalamazoo, have practiced packing of single hives with marked success. They place a box about the hives six inches distant on each side. This space they pack very closely with straw. They also put a chaff sack in the upper chamber of the hive, are sure to have the covers on the hive close fitting, and then pack well above with straw, when they add a cover to keep the straw dry.

These gentlemen attribute their success to careful, thorough packing, and close covers above the bees and beneath the packing. The packing extends close down to the earth. A tunnel at the entrance permits the bees to fly if suitable weather entices them out. Others, like Mr. Bingham, of Allegan county, are very successful in the use of packing, but put six or eight hives close side by side and pack snugly about all. In this case the entrances all face

out, and a tunnel at each hive permits flight. So many who pack lose their bees that I can but think the latter method named above is preferable for the average bee keeper if either is to be practiced.

Many others use chaff hives and some with success. Such hives are expensive, cumbrous, and, in view of the extensive losses by those using them, I question their desirability. From the great saving of food consumed by the bees, and the comparative freedom from danger, I feel that cellar wintering is far preferable in this climate to all other methods. This conclusion is formed only after many years' careful experiment. Other methods may succeed: this, with proper pains, surely will.

Ventilation.

If the cellar is all right—*surely so*—the entrance to the hive may be left wide open in the cellar. If it become too cold, less ventilation is imperative; if too hot, more may be required. But we must be sure to keep the temperature right. I feel positive that, with the proper temperature, we need not fear the presence of pollen, or bee bread, in the hive. If the cellar become too cold or too hot, in either case the bees become disturbed, and then I feel certain, after many experiments, that the bees are safer with no pollen. Yet such a disturbed condition is always dangerous. The fact is we *must be able to control and must control the temperature.*

The Cover.

As already stated, the cover should be a non-conductor of heat. Cloth with a filling of fine chaff or fine dry sawdust serves well. In winter I prefer to have a factory cloth over the bees, and a burlap sack full of dry sawdust still above the cloth.

METHOD OF PROCEDURE.

As soon as we have a frost, to stop storing, I place six or eight frames where they are desired for winter. These should be nearly full of honey. Place a short stick above the frames at the center, so the cloth can not fit close to the frames. This permits the bees to pass over. As soon as the brood is all hatched, remove all other frames and pack well above and beside the bees. If we are to pack out doors, do it now. From the 1st to the 20th of November, before severe weather, place the bees in the cellar, open the entrances, and remove the covers, but do not remove the cloth or burlap sacks. If the cellar is as described, the bees will remain very quiet and free from diarrhœa. If they are in a poor cellar, and so become diarrhetic, it is best to remove them from the cellar for a few hours some warm day, when they can fly out for a cleansing flight, and then return them to the cellar. It is always best, when taking colonies from the cellar, to place them on the same stands from which they were removed when carried to the cellar. We should not remove the bees finally from the cellar till they can go to work in the spring. In Central Michigan this is not before the 10th or 15th of April. In the spring, when the bees are placed on the stands, I would clean all of the hives out thoroughly—this should be on a warm, quiet day—and would remove frames of comb and move up the division board so that all the frames left will be covered with bees. We should also cover above and protect at the sides with ample packing. I have found that bees in single walled hives, thus protected, do as well in spring as those in chaff hives. As the bees increase, more frames should be added,

and so soon as the bees can protect the brood, the weaker may be strengthened by *receiving capped brood from the stronger,* but *never so rapidly as to* endanger the brood from chilling. Such has been our practice here at the college, and we have not been troubled by loss from "spring dwindling." I feel very sanguine that if the above suggestions are heeded, winter losses will cease to vex our northern bee keepers.

A. J COOK.

AGRICULTURAL COLLEGE,
Nov. 1, 1885.

No. 9.—FROM CHEMICAL DEPARTMENT.

MARL.

In many parts of the State farmers find, especially at the bottom of muck beds and shallow ponds, a layer of varying thickness of a white or yellowish-white material, differing so much from the ordinary soils in the vicinity that *they are curious to know what this mineral is, and what it is good for.* I have received so many specimens of this material for analysis, and so many letters of inquiry as to its value, and how to use it, that I have concluded to answer these questions once for all in the form of a bulletin.

The material is *marl;* and consists of carbonate of lime, carbonate of magnesia, sometimes a small amount of phosphate of lime, some oxide of iron, and a variable amount of clay and sand. I give the results of analysis of specimens from different parts of the State, which will afford a general idea of the composition of marls in this State:

MARL FROM BERRIEN COUNTY.

Carbonate of lime	79.60
Carbonate of magnesia	4.54
Oxide of iron	1.43
Clay and sand (insoluble in acids)	13.00
Organic matter and loss	1.43
Total	100.00

MARL FROM ST. JOSEPH COUNTY.

Carbonate of lime	56.16
Carbonate of magnesia	6.00
Oxide of iron	1.05
Sand and clay (insoluble in acids)	36.79
Total	100.00

MARL FROM LENAWEE COUNTY.

Carbonate of lime	90.00
Carbonate of magnesia	2.00
Sand and clay (insoluble in acids)	5.50
Organic matter	2 50
Total	100.00

MARL FROM OTSEGO COUNTY.

Carbonate of lime	80.00
Carbonate of magnesia	2.50
Phosphate of lime	1.50
Sand and clay (insoluble in acids)	16.00
Total	100.00

Marl is sometimes found in such quantity and of such purity that it is burned for lime, and affords a fair quality of "bog lime" for mason's use.

TEST OF VALUE OF MARL.

The value of marl depends almost entirely upon the amount of lime and magnesia it contains, and its value is diminished in proportion to the amount of clay and sand present. The lime and magnesia are found in marl mainly in the form of carbonates. A ready test for a carbonate in such cases is to pour on the material some strong acid, and if a carbonate is present, it will foam up or effervesce in the same way that saleratus will foam up when vinegar is poured over it; only the effervescence with marl is slower, because the marl is less soluble than soda. If the material does not foam when an acid is added, it is not a marl, but probably a clay.

MODE OF TESTING.

A good way to determine the quality and value of a marl is to determine how much of the material is soluble in common Muriatic Acid. This can be procured in any drug store, and ought not to cost more than ten cents a pound, as it only costs three cents a pound. One pound of the acid will be enough to test three or four specimens of marl. Mix the acid with one quart of rain water and put this in a bottle for use. Take a tablespoonful of the material supposed to be marl, put this in a large glass or earthen vessel (avoiding metallic dishes) and slowly pour over the material a half teaspoonful of the dilute muriatic acid. If it is a marl the effervescence will show this fact; if it all dissolves, leaving no residne or but little at the bottom of the vessel, it is marl of good quality. If but little is dissolved and a large residue is left at the bottom of the dish, it is of inferior quality.

By weighing out on delicate scales a definite quantity of the dry material, say 100 grains, and then weighing the washed and dried residue which is insoluble in acids, an estimate can be made of the percentage of active and inactive material in any specimen of marl. The insoluble residue is of no value.

A popular and simple test to distiuguish between marl and clay is made by placing a lump of the material in a basin of water and leaving it undisturbed for a short time. If it is marl it will crumble down into a diffuse mass, but if clay, it will be little changed.

USES OF MARL.

To the farmer marl is of value mainly as a fertilizer. When found on or near the farm it is the cheapest form in which lime can be applied to the soil, and exerts all the beneficial influences of lime, but in a milder degree than caustic lime. A certain amount of lime is required in every productive soil to furnish the necessary amount of lime found in the ashes of all plants, and absolutely required for their growth. But lime applied as a manure is used

greatly in excess of this amount. It *causes the decomposition* of inert vegetable matter found in many soils, and accelerates the elaboration of plant food.

When mixed with the soil marl destroys the acid condition in any soil, decomposes the sulphate of iron which is sometimes present, and affords the alkaline condition in soils so necessary for nitrification and preparation of plant food.

KIND OF SOIL BENEFITED.

Light sandy soils containing a fair supply of vegetable matter, and where the decomposition of humus is slow; soils that run to moss and bunch grass; soils so open and porous that the physical state of the soil prevents fruitfulness—all such soils will be benefited by a dressing of marl. So also where the excess of vegetable matter prevents successful cropping, as is seen in the shallow muck beds. When these "cat-holes" have been cleared of bushes and flags and properly drained, *it is often found that they run to wild grasses, or if grain is* sown, the product is loose-jointed straw instead of ripened grain. On such soils a dressing of 50 to 75 bushels of marl to the acre will greatly benefit the crop and ameliorate the soil.

To secure the benefits of marl it requires to be on or near the surface. This is one reason why the marl at the bottom of a muck bed exhibits no beneficial action. To do the most good marl needs to be finely pulverized and to be mixed with the surface soil. To *secure this fineness of division no agent is so good as* frost. If it is thrown on the surface of the ground and left all winter to the splitting wedge of frost, it will be found in the spring as mellow as an ash heap, and can then easily and uniformly be spread upon the field. Grass lands, whether in pasture or meadow, can thus be benefited by a surface dressing of marl. If two or three bushels of common salt are spread on each acre with the marl the benefit is usually greater. Indeed, the combination of marl and salt *is usually found to be beneficial.*

On grass lands the marl may be applied at any season when we are sure that frosts will follow so as to mellow and break up the clods. If it becomes dry and hard without freezing it may remain in lumps and be of very little benefit. In grain crops the finely divided marl exerts most benefit if applied just before seeding.

In the light soils of Otsego county, a dressing of marl was found to be very *beneficial to the corn crop.* I *would advise farmers to try it on the light soils* of our northern counties, if marl can be obtained near the farm. I also ask them to try the combination of salt and marl on such soils.

I have spoken mostly about the use of marl on light soils abounding in humus. Soils entirely destitute of vegetable matter will probably derive little benefit from marl.

On heavy clay soils marl will be less beneficial unless used in so large amount *as to change the physical properties of the soil.* The *expense of transporting* so large an amount of material as will be required to alter the physical properties of the soil, even when the distance is short, is too great for this region of cheap lands and high wages.

POWDERED LIMESTONE.

The inquiry has been made about the value of powdered limestone for manure. If the limestone is as finely pulverized as marl it wouldbe as valuable for manure. In these days of cheap fuel the least expensive way to grind the limestone

to dust is to burn it into caustic lime, and when this slakes in water, or, better still, air-slakes, by taking up water and carbonic acid from the air, the pulverization is most complete, and the material is in the best condition to be applied to the soil

The dose of marl to the acre is from 30 to 100 bushels. For arable soils and light lands 30 bushels will do. On lands having a large excess of vegetable matter, as in muck beds, the larger dose is desirable. There is little danger of injuring the soil by a heavy dose of marl, whereas an excessive dose of caustic lime may produce lasting injury. The marl is "mild," and entirely wanting in the burning qualities of caustic lime.

R. C. KEDZIE,
Professor of Chemistry.

AGRICULTURAL COLLEGE,
December 1, 1885.

No. 10.—VETERINARY DEPARTMENT.

A DISEASE AMONG HORSES THE RESULT OF INJUDICIOUS FEEDING.

In the spring of the year it is generally a matter of much consideration amongst farmers to have their horses in the best condition possible to do the work necessary at this season. and after a severe winter, which we often have in northern latitudes, many matters in the shape of extra farm work accumulate, which would have, weather permitting, been done before; and there is the spring plowing to be done, which, with a good pair of horses up to their work and in high spirits, becomes a much lighter task for the lover of horse flesh who tills the soil. We can scarcely wonder then that such a man will feed his horses well, and upon the most nutritious food while they are resting, recruiting as it were, in order that they may be the better able to perform their various duties when the time comes, and thus, through the error of liberality, quite a number of animals are sacrificed, "killed by kindness" every year. Again we find at this season of the year that horses kept for pleasure, or very light work, are often compelled to remain in the stable for several days, owing perhaps to inclement weather, and as such horses are generally pretty liberally fed and in high condition, they are frequently affected with the complaint which I am about to describe; but before doing so perhaps it may be better to settle upon a name for the disorder, and although this may appear to some an easy matter, or may be one of little importance, yet this very point has given rise to considerable controversy as to the cause, seat and other matters in connection with the disease—for instance, it has been called "Congestion of the loins," but I have seen cases where the muscles of the shoulders were alone affected. In the State of Michigan I have from time to time seen the disease referred to in agricultural papers as "Red water," but this is misleading from the fact that in some of the worst cases the water (urine) is not red; besides it differs from a disease of that name in the bovine tribe in several respects, among others the cause. Without however commenting at any length upon the name, let me say that the one by which it is generally recognized in this country by veterinarians is Azoturia, a name given to it from the fact that the urine has been found to contain an undue proportion of nitrogen during

an attack. So, adopting this cognomen, let us for a moment turn to the cause of the complaint, which in this case, as in all others, is the first thing to discover before we can hope to combat in an intelligent manner the invasion of the disorder; and in reference to it I may say, without going further, that experience has taught us beyond all reasonable doubt that the disease is caused by feeding horses too liberally upon nutritious food and not giving them any exercise. I may say in this connection that every case of this malady I have met with presented just about the same history, and may further say that those who have described the disease, did so in a manner which corroborates what I myself have witnessed, so I think if I just briefly outline in familiar terms the history which I invariably get, it may make an impression that will do good in the future, to wit:

The horse was in good condition and well fed, but owing to certain circumstances had not been out of his stall for a day or two. When brought out he was in the best of spirits, never, perhaps, feeling better in his life; but in a variable time, from a few minutes to, say, a quarter of an hour after being on the road, it would begin to show symptoms of distress, and the change from what would appear to be robust health, to extreme prostration is very alarming, indeed almost incredible, running its course and destroying life in a day or so; happily, though, this is a malady which, if dealt with judiciously, is often amenable to treatment.

This disease may occur at any season of the year, but in my experience is more prevalent in the early spring than at other times, owing, of course, to the fact that animals are more subjected to the exciting cause at this than at other times.

To be able to recognize the disorder in the early stages is a matter of importance, for the sooner appropriate remedies are administered the better.

THE SYMPTOMS

are usually very well marked, although we will once in awhile meet with cases where it is not easy to recognize the disease at first sight; as a rule, though, the horse, after being driven and allowed to stand, will tremble, sometimes violently. The eyes will present a very anxious look; perspiration will run down the face; sometimes the whole body is bedewed with sweat. The animal, at this stage, generally paws with its fore feet and soon lies down, or it will crouch behind and appear as if injured across the back, having much difficulty in manipulating its hind legs when required to walk, when it eventually lies down and in many instances is unable to rise, although it may be able to get up on its fore legs and sit, as it were, like a dog; but this attitude is not often attained more than a few moments, when the poor creature will fall upon its broad side. At this stage the urine, if voided or drawn away, is usually of a brownish red color. I have seen it described as being of the appearance of coffee, and, indeed, the comparison is striking. The breathing becomes hurried, the nostrils often being dilated and red within. When the hind quarters are apparently most affected they will have a hard board-like feeling when pressed upon with the hand; the same condition of the muscles will appear on the shoulders when the forequarters are affected. The pulse becomes elevated.

TREATMENT.

It has become a very threadbare expression to say that an "Ounce of pre-

vention is worth a pound of cure," but I know of no disease where this adage can be more appropriately applied than the one under consideration: so it goes without saying, that horses which are well fed should be exercised daily, or else they are liable at any time, after a day or more's rest, to come down with this disease. But when they do, the course of treatment which I have found from time to time to be of much benefit, is in the first place to give an active purgative consisting of about a quart of raw linseed oil; as soon as this has been administered the affected part should be covered with cloths wrung out of warm water and the whole covered with oil-cloth or other close fabric to keep the heat in. An enema may be given every hour or two until the bowels begin to act. It should be composed of soap and warm water. After about the first twelve hours the hot cloths may be left off, but the body should be kept comfortable and clothed according to the season. In some instances great relief is afforded in an hour or two after the hot cloths have been applied, in which cases they may be discontinued. In those cases in which the animals become very uneasy and knock themselves about considerably I have found great benefit from the use of chloral hydrate in doses of about four drachms every two hours or oftener until several doses have been given or the animal is influenced by the medicine. The urine should be drawn several times a day.

After a day or two it is a good plan to get the horse upon its feet, and a few steps of exercise will often stimulate the blood-vessels in the legs, and thus do much good. It is also a good plan to rub the legs thoroughly when it is possible to do so, say three times a day.

I think in cases of this kind the services of a veterinary surgeon should be secured as soon as they can be, for nearly every case differs somewhat in the manifestation of its symptoms, and requires somewhat different treatment, so that the above can only be looked upon as a general outline, but at the same time such a course will have a good effect in ordinary cases.

E. A. A. GRANGE, V. S.,
Prof. of Veterinary Science.

AGRICULTURAL COLLEGE,
February 1, 1886.

No. 11.—BOTANICAL DEPARTMENT.

MAKING A LAWN. MIXED LAWN GRASS SEEDS ANALYZED.

"Grass is the most lowly, the simplest, and the loveliest element to be used in the adornment of home. A smooth, closely shaven surface of grass is by far the most essential element of beauty on the grounds of a suburban home."—*F. J. Scott.*

"It would be a great gain to horticulture if ten out of every twelve flower-beds in Europe were blotted out with fresh green grass."—*Robinson's Parks of Paris.*

"A lawn is the ground work of a landscape garden."—*H. W. Sargent.*

"We love the soft turf which is thrown like a smooth natural carpet over the swelling outline of the smiling earth."—*A. J. Downing.*

Many of the farmers of Michigan, as well as large numbers of people who own, each one or more, lots in or near town, are seeking to improve their homes. In embellishing a place, we agree with the excellent authorities cited above, that nothing gives more satisfaction for the outlay than a well established and well kept plat of grass called a *lawn*.

Owing to the difficulty of learning to recognize the seeds, the purchaser is usually at the mercy of the dealer, whose interest it is to enshroud in mystery the whole subject of grasses for the lawn.

Most of the leading seedsmen of our country are advertising extensively and appear to be selling large quantities of "mixtures" of lawn grass seeds for which there is quite a variety of attractive names.

The writer has frequently examined these mixtures and has watched the success of several of them in various portions of the Northern States. For the benefit of the people who have so liberally supported Michigan Agricultural College, I present below the results of a careful "analysis" of the mixed lawn grasses sold by some of our largest growers and dealers in seeds.

In former years, the vitality of the rarer grass seeds has universally been found to be very low, while the germinating power of the common sorts, such as are raised in this and neighboring States, has been satisfactory.

The accompanying report does not contain a test of the vitality of the seeds, as a few of the packages have been kept over a year.

Owing to the great labor of assorting the seeds only a small portion of each package was "analyzed." A considerable quantity was carefully mixed and evenly spread on a table when two to five grams (about one-fifteenth to one-sixth of an ounce avoirdupois) was selected from each package. It is not probable that this analysis furnishes the exact proportions of the grasses found in a peck or a bushel of the mixture, but it approximates the correct result and gives the names of all the seeds which are found in any considerable quantity. An attempt has been made to procure mixtures which were thought to be the best in the market. These packages were not purchased directly of the seedsmen by us, but were ordered by friends in neighboring towns.

CHICAGO PARKS MIXTURE.

Sold by J. C. Vaughan, Chicago, Illinois.

The table shows the relative proportion of the different kinds of seeds found:

June Grass, or Kentucky Blue Grass, *Poa pratensis*, L., in the chaff	1740
White Clover, *Trifolium repens*, L., clean	90
Sweet Vernal, *Anthoxanthum odoratum*, L., in chaff	37
Perennial Rye Grass, *Lolium perenne*, L., in chaff	35
Orchard Grass, Cock's Foot, *Dactylis glomerata*, L., in chaff	30
Red Top, Brown or Creeping Bent, *Agrostis*, in chaff	16
Timothy, *Phleum pratense*, L., clean	6
Mixed and containing traces of the following	15

Velvet Grass, *Holcus lanatus*, L., in chaff (a weed).
Sedge, *Carex* (worthless).
(Narrow?) Dock, *Rumex* (a weed).
Panic Grass, *Panicum* (worthless).
Chickweed, *Stellaria* (a weed).

This mixture is advertised as ***especially adapted to the inland and western States***, and costs 25 cts. per quart, or $4.00 per bushel.

As will be seen, it consists mainly of June grass, which the same house offers at $1.50 per bushel; and the latter, if pure and sowed alone, is far preferable for a lawn to this mixture. Besides those marked weeds, the

others which are most objectionable are orchard grass, a coarse, bunchy grass, timothy, which is too coarse and short lived, perennial rye grass, which just takes the cream of the soil for a few years and then dies out.

FINE MIXED LAWN GRASS.

Sold in bulk by D. M. Ferry & Co., Detroit, Mich.

Table showing the proportions:

June grass, or Kentucky blue grass, *Poa pratensis*, L., in chaff	627
Perennial rye grass, *Lolium perenne*, L., in chaff	470
Timothy, *Phleum pratense*, L., clean	340
White clover, *Trifolium pratense*, L., clean	220
Red Top, Brown or Creeping Bent, *Agrostis*, in chaff	217
Mixed and containing traces of the following:	15

Velvet Grass, *Holcus lanatus*, L., in chaff (a weed).
Orchard Grass, *Cock's Foot, Dactylis glomerata*, L., in chaff.
Chess, *Bromus*, some species. (A weed).
Crowfoot, *Ranunculus bulbosus* (?) (a weed).
Dock, *Rumex* (a weed).
Lance-leaved Plantain, *Plantago lanceolata*, L., (a weed).
Shepherd's Purse, *Capsella Bursa-pastoris*, Mœnch. (A weed).

This mixture is sold at 50 cents per pound, or $4 per bushel, and is not so good as the Chicago parks mixture noticed above, because it contains a much smaller proportion of June grass and a much larger proportion of perennial rye grass and timothy.

FLINT'S LAWN GRASS.

Sold by D. M. Ferry & Co., Detroit, Mich.

Table showing the proportions:

Perennial Rye Grass, *Lolium perenne*, L., in chaff	526
Sheep's Fescue and Hard Fescue, seeds much alike, *Festuca ovina* and *var. duriuscula*, L.	295
June Grass, or Kentucky Blue Grass, *Poa pratensis*, L., in chaff	255
White Clover, *Trifolium repens*, L., clean	227
Red or Mammoth Clover, *Trifolum pratense* or *medium*, L., clean	130
Timothy, *Phleum pratense*, L., clean	105
Meadow Foxtail, *Alopecurus pratensis*, L., in chaff	103
Italian Rye Grass, *Lolium perenne*, var. *Italicum*, in chaff	47
Sweet Vernal, *Anthoxanthum odoratum*, L., in chaff	35
Hair Grass, *Aira flexuosa*, L., in chaff (a weed)	25
Chaff	80
Mixed seeds containing traces of the following	30

Chess, *Bromus* (a weed). Fescue, (species?) Velvet Grass (a weed). Self Heal, *Brunella* (a weed). Sorrel, *Rumex* (a weed). Ribbed Grass, *Plantago lanceolota*, L. (a weed). Chickweed (a weed). Nonesuch, *Medicago lupulina*, L. A sedge, *Carex*. Two or three others not recognized.

This mixture is sold at .... per quart or per bushel.

In addition to the objections made to the two former mixtures are the following:

Sheep's fescue and hard fescue grow in tufts or bunches and will not produce a lawn of even appearance. The red or mammoth clover will also produce a coarse patchy lawn, and the former will die out in two or three years. Italian rye grass will kill out the first winter. Hair grass is a weed substituted for crested dog's tail, which is a feeble grass of no value in this country.

FINE MIXED LAWN GRASS.

Sold by Hiram Sibley & Co., Rochester, New York.

Table showing the proportions:

June Grass, Kentucky Blue Grass, *Poa pratensis*, L., in chaff	995
Perennial Rye Grass, *Lolium perenne*, L., in chaff	373
Orchard Grass, Cock's Foot, *Dactylis glomerata*, L., in chaff	327
Red Top, Brown or Creeping Bent, *Agrostis*, in chaff	212
Velvet Grass, *Holcus lanatus*, L., in chaff (a weed)	22

Mixed and containing traces of the following:

Chess, *Bromus*, Sp. (?) (a weed).

Lance-leaved Plantain, Ribbed Grass, *Plantago lanceolata*, L. (a weed).

Dock or Sorrel, *Rumex* (a weed).

White Clover, *Trifolium repens*, L.

Timothy, *Phleum pratense*, L.

Crowfoot, *Ranunculus bulbosus*, L. (?) (a weed).

Shepherd's Purse, *Capsella Bursa-pastoris*, Mœnch (a weed).

The above is sold at $4.00 per bushel.

For objections to some of these ingredients, consult the comments inserted in connection with the former mixtures.

CENTRAL PARK LAWN GRASS SEED.

Sold in bulk by Peter Henderson & Co., New York.

Table showing the proportions:

June Grass, or Kentucky Blue Grass, *Poa pratensis*, L., in chaff	648
Red Top, Brown or Creeping Bent, *Agrostis*	528
White Clover, *Trifolium repens*, L., clean	158
Timothy, *Phleum pratense*, L., clean	38
Ergot of *Agrostis*, or Red Top, (infested with fungus)	10

Mixed and containing traces of the following:

Eggs of insects.

Dung of insects.

Dead insects.

Panic Grass, *Panicum* (a weed).

Chickweed.

Sheperd's Purse, *Capsella Bursa-pastoris*, Mœnch (a weed).

Dock, *Rumex* (a weed).

Orchard Grass or Cock's Foot, *Dactylis glomerata*, L.

Eleocharis, a rush or grass-like plant (a weed).

Round Leaved Mallow, *Malva rotundifolia*, L. (a weed).

This is sold for $5.00 per bushel, and is a good mixture omitting the seed of timothy. The house claims to have sold 70,000 packages in 1885. The same house offers June grass for $2.25, and Bent grass for $4.00 per bushel.

THE "HENDERSON" LAWN GRASS SEED.

Sold by Peter Henderson & Co., New York.

Table showing the proportions:

Brown or Creeping Bent or Red Top, *Agrostis*, in chaff	880
une Grass or Kentucky Blue Grass, *Poa pratensis*, L., in chaff	715
Vhite Clover, *Trifolium repens*, L., clean	120
heep's or Hard Fescue, *Festuca ovina* or var. *duriuscula*, L., in chaff	110
'erennial Rye Grass, *Lolium perenne*, L., in chaff	95
weet Vernal, *Anthoxanthum odoratum*, L., var. *Puellii*, in chaff	17
imothy, *Phleum pratense*, L., clean	10

A few seeds of Chickweed, some *Panicum*, Mallow, *Malva rotundifolia*, .., (a weed), Ergot, some other weeds not recognized.

This is much like the Central Park lawn grass previously noticed. This ne contains some seeds of small fescues apparently mixed, a little perennial ye grass, which is no benefit to it, and a very little Timothy, which would e better to omit, and a small amount of sweet vernal, which apparently is he annual variety and of no value. The three leading ingredients are the une grass, Bent grass, and white clover. The seller claims this as a new nixture for lawns, and the successful result of two years' (!) experimenting.

It was the freest from weeds of any mixture examined. It is sold for 25 ts. per quart or $5.50 per bushel. The same house sells June grass for 2.25 per bushel, Bent grass for $4.00 per bushel, white clover for 40 cts. er pound.

The preceding tables and the remarks below each should be studied in onnection with what follows:

The lawn surrounding the State capitol in Lansing has been much admired. 'o begin with, the land is clay, and was thoroughly tile-drained, deeply renched and well fitted in every respect. I am not certain what mixture f seeds was sown, but for a few years, the lawn contained much perennial ye grass, none of which now remains alive, at least none to amount to anyhing. There was some ribbed grass and other weeds which have been carefally removed at a great expense of labor. The main things to be seen in he land this season were June grass and white clover, with some fine red op or bent grass.

At the Agricultural College, numerous plats in various seasons and soils, nixed and separate, have been tried, and those grasses of most value are une grass and a small red top. White clover often thrives well with these, ut it varies much with the change of seasons. Sod taken from a rich old asture or the roadside usually makes an excellent lawn as soon as laid, but is too expensive for a large plat. The main grasses making such a turf re those last mentioned, June grass and red top, with perhaps some white lover.

In making a lawn, too little stress is usually placed on thorough trenching r subsoiling and enriching the land. The surface should be harrowed and and-raked till it is in the finest condition.

Our experience fully accords with the following from A. J. Downing, who ong ago wrote on many rural topics:

"Now for the sowing: and here a farmer would advise you to 'seed down with oats', r some such established agricultural precept. Do not listen to him for a moment. Do ot suppose you are going to assist a weak growing plant by sowing along with it a oarser growing one to starve it."

With the writer's experience, having tested for some years over two hundred kinds of grasses and clovers, both native and foreign, for Michigan and places with similar climates, he would sow about two bushels of seeds (in the chaff) of June grass, *Poa pratensis*, L., and two bushels of some small bent grass, known as Rhode Island Bent, Brown Bent, or Creeping Bent, or as red top. The latter grasses vary much and are usually much mixed, as they were in all the samples above examined.

A few ounces of white clover may be added, if the owner prefers, but it is by no means very important. Each one of these two or three kinds of plants will appear to cover the ground all over, so it will look uniform.

To the farmer who is accustomed to sow coarse seeds for a meadow or pasture the above quantity of seeds appears to be enormous. But the aim is to secure many very fine stalks instead of a few large coarse ones.

If a little sweet vernal and a little perennial rye grass are used a careful observer, at certain seasons of the year, will see that the lawn looks "patchy." Especially in early spring, or in very dry weather, some of these and others *often recommended, will grow faster than the rest and assume different* shades of green. For a lawn *never* use any Timothy, orchard grass, tall oat grass, red clover, meadow fescue or other large grass or clover, but only the finest perennial grasses or clovers. Sow the seeds in September or in March *or April, without any "sprinkling" of oats or wheat, and as soon as the* grasses get up a little and the straggling weeds get up still higher, mow them, and keep mowing every week or two all summer.

Avoid purchasing mixtures advertised in seed catalogues, as it will be much cheaper and safer to buy each sort separately, and only one or two or three sorts are desirable. The rarer grasses are mostly imported, and up to the present time, as was said, have been found to possess very low vitality; besides, bad foreign weeds are very commonly mixed with these grass seeds. There are good reasons, then, for buying common sorts, and, if possible, those raised and cleaned in a careful manner.

James Hunter, of England, in his manual of grasses, says: "Careful analysis of the mixed lawn grass seeds sold by some large seed houses at high prices prove them to consist of from 40 to 50 per cent. of rye grass, whereas not a single seed of rye grass should be included in any mixture for producing a lawn."

The Royal Agricultural Society of England employs a consulting botanist, Wm. Caruthers, who, for small fees, tests the seeds for its members. He finds it best to avoid purchasing mixtures for lawn, pasture or meadow.

The editor of the *Gardener's Monthly* echoes the sentiments of our best judges in this matter when he advises for lawn to sow June grass or red top either one alone or both mixed.

E. S. Carman, one of the editors of the *Rural New Yorker* and manager of a fine homestead and an experimental farm, writes: "Thirteen years ago we sowed on different parts of an acre of lawn blue grass, red top, Rhode Island bent and the 'lawn mixtures' sold by seedsmen. To-day the red top presents the finest and brightest appearance, while the 'lawn mixture' portion has since been re-sown with red top and blue grass."

IN CONCLUSION.

If not so already, make the soil strong, drain thoroughly, deeply pulverize, harrow and hand rake the surface carefully. In early spring, or in

early autumn if not dry, sow, without any wheat or oats, three or four *bushels to the acre of June grass* or red top, either one or a mixture of both in any proportion.

W. J. BEAL,
Professor of Botany and Forestry.
AGRICULTURAL COLLEGE, MICH., March 10, 1886.

NO. 12.—DEPARTMENT OF HORTICULTURE AND LANDSCAPE GARDENING.

I.—HINTS ON RURAL ADORNMENT, WITH LISTS OF HARDY ORNAMENTAL PLANTS.

The adornment of rural homes should be considered a necessity rather than a luxury. As the country becomes older and natural windbreaks are destroyed, it is imperative that we plant for protection. The attractions of farm life for our sons and daughters is largely determined by the character of the arrangement and exterior adornment of the home and farm premises. Our climate is a rigorous one, however, and it brings serious discouragements to those who would ornament their premises. But it should be remembered that the beauty of a home does not depend so much upon the number and variety of species of plants as upon the taste of the planter. The elements of attraction in landscape gardening are comparatively few and simple. A tasty and thoughtful disposition of a half dozen kinds of ordinary trees and shrubs is far preferable to a thoughtless mixing of twenty rare and more beautiful kinds. So far as practicable, trees and shrubs should be planted in groups, especially at some distance from the house. In this way a greater variety is secured. These groups should be so disposed as to hide from the common points of view, especially from the windows of the residence, all undesirable objects and to afford glimpses of all attractive objects and landscapes. It is a serious mistake to pack the front yard full of bushes and flowers. The first requisite to an attractive place—a good lawn—has been discussed in bulletin No. 11, just issued by the Botanical Department.

As over half our year is practically winter, it is important that we should plant for winter effect as much as for summer effect. It is surprising that so few people see any attraction in leafless trees. The aspects of deciduous trees in winter are singular and characteristic for each species. When one begins to study them he soon comes to appreciate their importance in winter landscapes. Among deciduous trees I like best the winter aspect of the pepperidge or sour gum, Nyssa multiflora. The peculiar tortuous short horizontal branches designate the tree from its companions. The beech, when grown singly, approaches the pepperidge in character, but never equals it. The second best tree for winter effect is probably the swamp white oak, Quercus bicolor. Then follow the burr-oak, white oak, especially slow-growing specimens, beech, the exotic weeping white birch, buttonwood, and

finally the more symmetrical and straighter limbed trees, as maples and elms. I think it is desirable to plant with reference to the winter aspects of deciduous trees and shrubs.

The evergreens must comprise the chief attractions of winter landscapes, however. *A list of such as are desirable and have proved hardy at the college is appended.* Somewhat similar lists as those which follow were given in a recent bulletin, but these are more complete. The climate at the college is exceedingly trying on plants, and many trees and shrubs which are hardy in villages in the vicinity have not endured the winters upon our grounds.

CONIFEROUS EVERGREENS.

Norway spruce.
White spruce—*Abies alba.*
Oriental spruce—*Abies orientalis.*
Balsam fir—*Abies balsamea.*
Black spruce—*Abies nigra.*
Western blue fir—*Picea pungens.*
Common hemlock.
Common arbor vitæ—*Thuya occidentalis.*
Thuya occidentalis forma *globosa.*
" " forma *ericoides.*
" " forma *Hoveyi.*
" " forma *pyramidalis.*
" " forma *Sibirica.*
Retinospora squarrosa.
R. pisifera.
R. decussata.
Savin—*Juniperus Sabina* variety *procumbens.*
Red cedar.
Juniper—*Juniperus communis.*
Swedish Juniper—*J. communis* forma *Suecica.*
Sciadopitys verticillata probably; tried only one winter.
Cembrian pine—*Pinus Cembra.*
White pine—*P. strobus.*
Scotch pine—*P. sylvestris.*
Scrub pine—*P. Banksiana.*
Dwarf pine—*P. pumilio.*
Red pine or "Norway" pine—*P. resinosa.*
Austrian pine—*P. Austriaca.*

NOTES.—For all purposes the Norway spruce is probably our best evergreen, although it is too coarse and it grows too large for the immediate vicinity of the house. *In order to grow good Norways, they must not be* crowded by other trees, and the lower limbs must not be allowed to get ragged. It is a great mistake to trim up evergreens from the bottom. Their greatest beauty lies in compact lower limbs. The tree can be kept compact and green to the base by heading in the branches a few inches every year or two. There are many trees upon the grounds which are green and dense to the ground, although they are twenty-five years old. These have not been trimmed to such an extent as to destroy the natural form and grace of the tree.

The white spruce should take the place of the Norway for planting within four or five rods of the house. It is a smaller, more compact and lighter colored tree. It is not sufficiently known. The Oriental spruce is remarkable for the enduring greenness of its lower limbs. Although a specimen upon the grounds has been seriously scorched by two winters, I should regard it as hardy under ordinary circumstances; it stands here in one of our most exposed places. It is a slow-growing tree. The balsam fir and black spruce soon become ragged below. The hemlock should be planted behind a group of trees, so as to be partially screened from sun and winds. It is then our handsomest evergreen. The blue fir varies much in blueness. Seedlings do not come true in this regard. The most reliable trees are secured by grafting from the best trees. Norways are largely used as stocks.

The arbor vitæ is always desirable, although on poor soil it gets scraggly in a few years. The Siberian holds its color best in winter, and on the whole, is probably the best of the horticultural varieties. All these varieties are small and compact, and well adapted to the immediate vicinity of the house.

The Retinosporas or Japanese cypresses, are dwarf, slow-growing evergreens of great merit. R. squarrosa is especially attractive. R. decussata has been tried here only one winter, but it stands in a very exposed place and does not appear to be injured. For ornamental planting the pines probably stand in about the order named above.

Our experience with evergreens is in favor of planting in late spring, just as the growth begins.

SHRUBS.

Mock orange—*Philadelphus coronarius.*
Alder—*Alnus serrulata* (native).
Cut-leaved alder—*Alnus glutinosa* forma *laciniata,* (*imperialis laciniata*).
Spiræa triloba.
Spiræa sorbifolia.
Robinia hispida.
Missouri or "flowering" currant—*Ribes aureum* (*R. fragrans*).
Flowering almonds—*Prunus nana.*
Red-twigged osier—*Cornus stolonifera* (native).
Flowering dogwood—*Cornus florida* (native).
Witch hazel—*Hamamelis Virginiana.*
Choke cherry—*Prunus Virginiana.*
Mahonia—*Berberis aquifolium.*
Clethra alnifolia.
Itea Virginica.
Bladder-nut—*Staphylea trifoliata* (native).
Juneberry—*Amelanchier Canadensis* var. *Botry apium* (native).
Wild crab—*Pyrus coronaria.*
Cock-spur thorn—*Cratægus Crus-galli.*
Fringe—*Chionanthus Virginica.*
Smoke-tree—*Rhus Cotinus.*
Dwarf sumac—*Rhus copallina.*
Common lilac—*Syringa vulgaris.*
Persian lilac—*S. Persica.*
Josika lilac—*S. Josikæa.*
Tartarian maple—*Acer Tartaricum.*

Japanese quince.
Hydrangea paniculata forma *grandiflora.*
Rosemary-leaved willow—*Salix rosmarinifolia.*
Kilmarnock willow—*Salix Capræa* forma *pendula.*
Shining willow— *Salix lucida* (native).
"Pussy" willow—*Salix discolor* (native).
Weeping aspen—*Populus grandidentata* forma *pendula.*
Tartarian honeysuckle—*Lonicera Tartarica.*
Deutzia gracilis.
Siberian pea tree—*Caragana arborescens.*
Common elder—*Sambucus Canadensis.*
Snowball—*Viburnum Opulus.*
Winter-berry—*Ilex verticillata* (native).

VINES.

Common hop.
Virginia creeper.
Trumpet creeper—*Tecoma radicans.*
Common wild clematis—*Clematis Virginiana.*
Various cultivated clematises.
Wild wax-work—*Celastrus scandens.*

NOTES.—Most flowering shrubs present the best effect when planted in small groups. Flowering almonds are sometimes injured by the winter, but they spring up again so quickly and are so pretty that they are recommended. The same remark will apply to the Japan quince; of this the deep crimson variety is the best.

The Mahonia or evergreen barberry should be planted behind a clump of trees in order to be partially screened from the winter and spring sun. In fact, all broad-leaved evergreens profit by such protection.

Clethra alnifolia possesses a delightful spicy odor.

The wild dwarf sumac, Rhus copallina, is especially desirable for autumn coloring.

The Josika lilac possesses the advantage of blossoming two weeks after the blossoms have fallen from the other lilacs.

The Rosemary-leaved and Kilmarnock willows should be grafted upon hardy stocks. The stocks of these trees, as we get them from the nurseries, are oftener injured than are the tops.

Deutzia gracilis is often injured, but the plant is so small that it is easily protected by a covering of leaves or straw. It deserves a place in every yard. Vigorous plants of the large *Deutzia, D. crenata,* passed this winter with some injury in an exposed place.

The common elder, when properly trained, is one of our most attractive shrubs. On a good lawn which is often mowed, I do not think that it will sprout enough to make trouble.

The trumpet creeper has been often injured upon the grounds, although it has stood well in a city lot in Lansing. It is too desirable to be discarded, however. If trained to several stems it can be laid down the same as a grape vine. The same may be said of the cultivated clematises.

DECIDUOUS TREES.

American or white elm—*Ulmus Americana.*

Cork elm—*Ulmus racemosa.*
Norway maple—*Acer platanoides.*
Wild black sugar maple—*Acer saccharinum* variety *nigrum.*
Sugar maple—*Acer saccharinum.*
Wier's cut leafed maple—*Acer dasycarpum* forma *Wierii.*
Silver maple—*Acer dasycarpum.*
Red, swamp, or soft maple—*Acer rubrum.*
Sycamore maple—*Acer Pseudo-platanus.*
Cut-leaved weeping birch—*Betula alba* forma *laciniata* (*laciniata pendula*).
Purple birch—*Betula alba* forma *purpurea.*
Paper or canoe birch—*Betula papyrifera.*
European white birch—*Populus alba.*
American white birch—*Betula alba* variety *populifolia.*
Common beech.
Cucumber tree—*Magnolia acuminata.*
Tulip-tree, or whitewood—*Liriodendron tulipifera.*
Kentucky coffee tree—*Gymnocladus Canadensis.*
Pepperidge or sour gum—*Nyassa multiflora.*
Swamp white oak—*Quercus bicolor.*
Burr oak—*Quercus macrocarpa.*
Chestnut oak—*Quercus Prinus,* especially the variety *acuminata.*
White oak—*Quercus alba.*
Black ash.
White ash.
Horse chestnut.
Yellow wood or Virgilia—*Cladrastis tinctoria.*
Wisconsin weeping willow—*Salix Babylonica* variety.
Bald cypress—*Taxodium distichum.*
Wild black cherry—*Prunus serotina.*
Ginkgo or Salisburia—*Ginkgo adiantifolia.*
Box elder—*Negundo aceroides.*
Sassafras.
Tamarack—*Larix Americana.*
European larch—*Larix Europæa.*
Plane tree or buttonwood—*Platanus occidentalis.*
American basswood or linden.
European basswood or linden.
Bitternut—*Carya amara.*
European Mountain ash—*Pyrus Aucuparia.*

NOTES.—The maples are desirable in the order named.

The purple birch holds its color well. The purple beech has been tried to a limited extent without success. Recent plantings have been made. It is a form of the European beech which is evidently tender here. The cut-leaved weeping birch is worthy a place in every yard.

The cucumber tree is hardy under ordinary circumstances. Ours has been in a trying place and has suffered somewhat.

The winter aspect of the Kentucky coffee-tree is singular, and its summer dress is scarcely less so.

The pepperidge is valuable alike for autumn coloring and winter oddity.

Our native oaks are recommended in the order named.

The black ash is preferable to the white ash for ornament. It thrives here on upland.

For floral display the yellow wood is the finest tree on the list.

The bald cypress was injured a little a year ago.

The plane tree is not often enough planted. Its Old World congener, Platanus orientalis, is not hardy.

The American mountain ash, Pyrus Americana, is probably as good as the European, but we have not grown it. Trees purchased for the American species prove to be the European one.

II. HORTICULTURAL EXPERIMENTS AND LISTS OF RECENT ACQUISITIONS IN FRUITS.

Although the Department has no special means for the conducting of *experiments, several lines of investigations have been inaugurated.* Suggestions and aid from the fruit-growers of the State are solicited. It is especially desired that those who originate new fruits or vegetables, or who have old fruits not on our lists and which are worthy of trial, should send us plants, scions, or seeds of the same. Accurate and minute record will be kept of each variety, and an honest trial will be given. A synopsis of horticultural experiments is appended, the series being arranged about in the order of their importance. In each series we have under way one or more experiments, according to our means for conducting them.

SYNOPSIS OF HORTICULTURAL EXPERIMENTS.

Series A. Acclimation and adaptation of fruits and vegetables. Fruits and vegetables of acknowledged merit in one or more directions, both exotic and from foreign portions of the United States, will be grown and tested, and their acclimation will be attempted in some cases.

Series B. Improvement of native wild fruits.

Series C. Improvement of fruits and vegetables by crossing and hybridizing.

Series D. Experiments to determine limits of crossing and best methods of manipulation.

Series E. Mutual relations between stock and scion, and limits within which grafting is possible and profitable.

Series F. Experiments upon methods and *possibilities* of propagation by *all* methods of making cuttings, layers, etc. These experiments will have especial reference to the propagation of native wild plants. This subject, and that outlined in Series G, although old, are very imperfectly understood.

Series G. Germination experiments, concerning behavior of seeds and germination, especially in wild plants. Experiments to determine the effect of cold upon seeds are now in progress.

Series H. Improvement of native wild plants for ornamental purposes.

Series I. Effects of soils, selection and culture upon *variability* of plants.

Series J. Studies upon Classification, Terminology, and Nomenclature of fruits and vegetables.

Series K. Synonymy. It is a conspicuous fact that many or most of the seedman's novelties are old varieties or very *slight and unimportant modifications* of them under new names. It becomes the business of experimenters to test all varieties of every product side by side, and to determine some standard or measure for each variety. It is impossible to undertake experiments in this line upon more than one kind of vegetable at a time with ordinary *facilities. All American varieties* of tomatoes are being grown this year.

Series L. Special observations upon the *behavior of individual* plants and varieties.

Series M. Studies concerning the influence of latitude upon vegetation; also observations for determining minimum and maximum periods of plant activity.

Series N. Methods and modifications of grafting and budding.

Series O. Testing commercial varieties of fruits and vegetables.

Series P. Tools and methods of culture.

It is proposed to set a huckleberry plantation next spring.

A hot-bed heated with a home made coal furnace was constructed last fall. This has worked well. It will probably prove to be a cheaper hot-bed than the manure beds in common use. Details of its construction may be expected later.

Bulletin No. 7, issued last October, contains a list of our fruits. This spring the following fruits, and many others, will be added:

APPLES.

Arabskoe.
Arnold's Beauty.
Bailey's Sweet.
Beauty of the West (*Western Beauty*).
Bennington Stripe.
Ben Peffer.
Bernard.
Bethel.
Bidgood.
Black Twig.
Blinkbonny.
Blooming Beauty.
Bonne Gardner.
Broadwell.
Cadwallader's Golden.
Celestia.
Cellini.
Cheese.
Chenango.
Choice.
Clark's Orange.
Clermont.
Cole's Quince.
Cooper's Early White.
Cornell's Fancy.
Dawe's Porter.
Decarie.
Domine.
Dr. Noyes.
Dumpling of Iowa.
Durham's Winter.
Early Colton.
Early Pennock.
Early Ripe.
Egyptian Russet.
Fairchild's Wisconsin.
Fall Spitzenbergh.
Fameuse Sucrée.
Flower of Genesee.
Fourth of July.
Fulton.
Gibb's Apple.
Lewis.
Maiden's Favorite.
Mann.
Marquis of Lorne.
Mason's Orange.
McIntosh Red.
Mexico.
Milden.
Minkler.
Missouri Pippin.
Monstrous Bellefleur.
Mote's Sweet.
Muster.
Nickajack.
Nicnac.
Occident.
Ontario.
Pear of Illinois.
Pewaukee.
Pickard's Reserve.
Pittsburg Pippin.
Pomeroy.
Portsmouth Beauty.
Powers.
Presh's Winter.
Pyle's Green Winter.
Ragan's Red.
Red Russet.
Richard's Graft.
Ridge Pippin.
Rock Pippin.
Rolfe.
Roman Stem.
Rubicon.
Salome.
Sawyer.
Scott's Best.
Seedless.
Shiawassee Beauty.
Somerset (of Maine).
Southern King.
St. Hilaire.
St. Lawrence.

Gideon's No. 9.
Greyhouse (*Hoopes*).
Haas.
Hancock.
Hawthornden.
Henwood.
Highland Beauty.
Hubbardston.
Hubbardton Pippin.
Hunterdon.
Huntsman's Favorite.
Hyde's King of the West.
Indiana Favorite.
Indiana Seedling.
Johnathan.
Kansas Bellefleur.
Kansas Queen.
Keyes' Red.
Kinkead.
Lady.
Large Summer Queen.
Lawver.
Stark.
Stayman's No. 2.
Stayman's Winesap.
Strode's Birmingham.
Stuart's Golden.
Stump.
Summer King.
Summer Sweet Paradise.
Superb Sweet.
Surprise.
Sutton Beauty.
Sylvester.
Tetofsky.
Tippecanoe.
Walbridge.
Washington Strawberry.
White Pippin.
Whinnery's Late Red.
White Winter Pearmain.
Winter Sweet Paradise.
Wolf River. And others.

BLACKBERRIES.

Cratægus-leaved.
Early Cluster.
Early Harvest.
Evergreen (Oregon).
Missouri Mammoth.
Stayman's Early.
Wallace.
Western Triumph.
Wilson's Early.

CHERRIES.

Belle Magnifique.
Bigarreau Blanc.
Black Eagle.
Dyehouse.
Empress Eugenie.
Flemish Morello.
Hoppock's Yellow.
Large Morello of Tennessee.
Large Montmorency.
Leib.
Louis Phillippe.
Ohio Beauty.
Olivet.

CRAB APPLES.

Bryant's Favorite.
Byer's Beauty.
Cherry.
Coral.
Currant.
Meader's Winter.
Minnesota Winter.
Montreal Beauty.
Oblong.
Orange.
Paul's Imperial.
Pewell.
Dartmouth.
Fay's Gem.
Hyslop.
Large Red (from Nova Scotia).
Large Yellow.
Picta Striata.
Power's Large.
Quaker Beauty.
Queen's Choice.
Stayman.
Telfer Sweet.
Van Wyck's Sweet.
Wanglis.

DEWBERRIES.

General Grant.
Lncretia.
Lucretia's Sister.

GOOSEBERRIES.

Cluster.
Hudson.
Transparent.
Triumph.

GRAPES.

Mary.
Progress.

HUCKLEBERRIES.

Black.
Common Swamp.
Dwarf.
High-bush.
Low-bush.

PEARS.

*Bailey.
Birket.
Century.
Chinese Sand.
Cocklin.
Duchess Hybrid.
Early Harvest of New Jersey.
Early Harvest of Ohio.
Garber.
Grand Isle.
Japanese large-leaved.
Jefferson.
Little Gem.
Macomber.
Refreshing.
Sandwich Island.
Sha Lea.
Smith's Hybrid.
Suet Lea.
Wilkinson's Winter.
And others.

PLUMS.

Golden Gage.
Kelsey's Japan.
Moore's Arctic.
Pond's Seedling.
Shipper's Pride.

PLUMS—*Native:* (*Prunus Chicasa* and *P. Americana.*)

African.
Bassett.
Blackman.
Caddo Chief.
Clinton.
Colletto.
Cumberland.
De Caradeuc.
Deep Creek.
Indian Chief.
Itaska.
Jenny Lucas.
Langdon.
De Soto.
Early Red.
Forest Garden.
Forest Rose.
Golden Beauty.
Gordon's Nos. 1 and 2.
Hattie.
Indiana Red.
Purple Yosemite.
Quaker.
Reed.
Robinson.
Rollingstone.

* A seedling sour pear grown by L. H. Bailey, South Haven, Mich. A full characterisation may be expected next fall.

Leptune.
Lone Star.
Miner.
Minnesota.
Minnetonka.
Moreman.
Newman.
Parsons.
Wayland.
Wazata.
Weaver.
Wier's Large Red.
Yellow Yosemite,
And others, including seedlings from wild trees.

QUINCES.

Bentley.
Champion.
Missouri.
Hong-kong.
Rhea.

RASPBERRIES.

Burlington (*Prosser*).
Davison's Thornless.
Earhart.
Golden Queen.
Hilborn.
Lost Rubies.
Philadelphia.
Reliance.
Superb.
Sweet Home.
Thwack.
Tyler.

And others, including seedling grown by J. T. Macomber, Grand Isle, Vt., *and figured in* Rural New Yorker *for March* 6, 1886.

STRAWBERRIES.

Belmont.
Black Defiance.
Champion.
Cornelia.
Cowing.
Duncan.
Early Canada.
Garretson.
Great American.
Huddleston.
Lida.
May King.
President Lincoln.
Primo.
Sunapee.
Warren,
And others.

MISCELLANEOUS.

Breda Apricot.
Moorpark Apricot.
Boston Nectarine.
Tong-pa Peach.
Seedling Peaches.
Hick's Everbearing Mulberry.
New American Mulberry.
Japanese Chestnut.
Spanish Chestnut.
Chinquapin—*Castanea pumila.*
Soft Almonds.
Prunus maritima.
Medlar—*Pyrus Germanica.*
June-berry — *Amelanchier Canadensis.*
Cultivated Service-berry — *Amelanchier.*
Aucuba-leaved Apple.
Paradise stocks.
Various Chinese Pears — *Pyrus Sinensis.*
And various exotic peaches, apples, currants, etc.

L. H. BAILEY, Jr.,

Professor of Horticulture and Landscape Gardening.

April 1, 1886.

NO. 13—FARM DEPARTMENT.

POTATO CULTURE.—VARIETIES—EXPERIMENTS WITH DIFFERENT AMOUNTS OF SEED.

The writer has received a number of letters from different parts of the State of similar import to the following, from a well-known farmer of Ionia county:

"MY DEAR SIR:—I desire to ask a few questions as to your experience at the College Farm, in the planting and raising of potatoes, as to the amount of seed to be put in a hill, the distance between the rows, the distance between the hills, in the rows, the proper time to plant for winter use, etc.

"Considering the importance of the potato crop it does seem to me that more should be known as to the best method of raising the crop.

"Of all the farm crops raised in no one is there such a diversity of practice as in the cultivation and raising of potatoes."

This bulletin is sent out as a reply to queries of this sort, and with the hope that it may be of use, not so much to the potato specialist as to those who have had but little experience in growing this important crop, or who have never given much attention to their methods.

POTATO CULTURE.—SOILS AND FERTILIZERS.

The soils best adapted to the potato are sandy and gravelly loams. Clay soils, if the season be wet, produce very poor potatoes, and they will be much more liable to rot than those grown on sandy land.

An old pasture turned over or any sod ground is specially fitted for the growth of the potato.

A little well rotted compost harrowed in thoroughly upon such a sod, to give the plants a good start, will usually give a fair crop upon comparatively poor soil. The potatoes grown upon sod are usually smoother, less liable to rot and of superior quality.

The application of fresh stable manure is not desirable on potato land, as it frequently results in a diminished yield and greatly increases the liability to rot.

Mucky soils in a dry season often produce a good crop; but as they are deficient in organic matter an application of leached ashes will be found desirable to supply the potash essential to the growth of the potato.

Ashes may be considered as a special fertilizer for potatoes, adding to the yield and improving the quality.

They can he used on the hill or in it. A good way is to mix them with the earth that covers the seed; or as a top dressing after the plants are fairly started.

PREPARATION OF THE SOIL.

The soil should be thoroughly plowed and harrowed until it is well pulverized and leveled. More potatoes can be grown in drills three feet apart and from twelve to eighteen inches apart in the drill than when the ground is rowed each way and the planting is in hills three feet apart.

It is more work, however, to keep the potatoes clean, and necessitates more or less hand hoeing.

In field culture we think rowing both ways and planting in hills three feet apart each way the most economical and satisfactory. In cultivation keep the land free from weeds and as level as possible; avoid hilling up, because hills heat and cool more rapidly than a level surface, and feel the effect of drought more. Use a marker that makes a deeper furrow than the corn marker. The varieties that produce tubers close together require deeper planting, or the upper ones will be exposed above ground. It is better to cover such varieties to the depth of five or six inches.

Deep planting, especially on sandy soil, is a good rule to adopt in potato culture.

SEED.

For seed select perfect specimens of good shape and of medium size rather than the largest potatoes, and cut with three or four eyes on a piece. Some growers think it best to cut the potatoes some days before planting, spread them on a floor and sprinkle with gypsum or land plaster.

I am of the opinion that it is quite as well to cut them when planted. It is often, however, desirable to have the cutting done before the hurried time of planting.

My own experience leads me to question the practicability of cutting to single eyes and planting three or four eyes in a hill. We prefer one piece with three or four eyes to less or more seed.

The expense of cutting to one eye is no small item.

If the weather is dry there is so little of the potato that it dries up altogether or makes but a sickly growth. The larger piece has vitality enough to start a good healthy plant.

TIME OF PLANTING.

Some growers favor early planting. Some seasons the early planted give best returns, and other seasons the late.

We generally intend to plant the main crop about the middle of May, and while no rule can be adopted as to time, we are inclined to the opinion that in most localities in Michigan it is early enough.

CULTIVATION AND HARVESTING.

If the potatoes are a long time coming up, it is best to run over the field with a light harrow. Anything that will stir the ground sufficiently to cause the death of the little weeds and break the crusted surface will answer. When the rows can be seen, with a shovel plow cover the rows of new plants with about two inches of earth. This should be done thoroughly. Frequent cultivation during the growing season is essential to a good crop, and if attended to properly there will be little need of hand labor.

In August it is well to go through the fields, each hand taking from four to six rows, and pull any large weeds that may have escaped the cultivator.

Dig as soon as thoroughly ripe, and when the ground is dry, if possible. Store in a cool, dry place.

We have never had a potato digger that proved satisfactory, and still continue to dig in the old-fashioned way with hooks.

VARIETIES.

We have been testing several of the newer varieties for some years. The Beauty of Hebron and Burbank's Seedling are our main sorts for field culture.

They yield well and are of excellent quality. The Early Ohio, Clark's No. 1, the Rural Blush, and the White Star, are good yielding sorts, but they have not proved equal, with us, in smoothness, uniform size and quality, to the two varieties first named.

I clip from the New England Homestead a few notes, on papers on potato culture, read at the winter meeting of the Massachusetts State Board of Agriculture, by Hon. Edmund Hersey, of Hingham, Mass., and Major Alvord, of Houghton Farm, N. Y.

Mr. Hersey is said to have had a lifetime of observation and experience with this crop, and Major Alvord is known as a careful experimenter. It will be seen that there is some difference in the opinions expressed.

"Mr. Hersey said, thus far, he has got the most, the largest, and the best quality of potatoes from small tubers cut two eyes to a piece. Here are his conclusions:

"1. *The shape of a potato cannot be changed by the continued selection* of any particular form of the seed planted. 2. The crop may be increased by selecting for seed healthy, well kept tubers, and diminished by selecting for seed diseased and poorly kept potatoes. 3. Hard potatoes that have sprouted but little are better for seed than those that are soft, or have any long sprouts. 4. Long continued planting of any variety gradually changes its characteristics. 5. Large crops are only obtained on rich soils, well prepared by being thoroughly pulverized. 6. In ordinary field culture the size of the tubers planted should be sufficient to give the young plants a vigorous start. 7. Neither the size or form of the seed tuber is of half as much consequence as is its healthy condition or its vital powers. 8. No rule can be laid down in regard to the quantity of seed per acre, the amount of manure to be applied, or the particular method of cultivation. 9. One or half a dozen experiments are not sufficient to establish any particular facts, and each one must experiment for himself on his own farm.

"Following Mr. Hersey's address, came the reading by Secretary Russell of a paper from Major Alvord detailing the experiments with potatoes at Houghton Farm, New York, during the past season. A collection of tubers grown in this experiment were displayed at several of the Massachusetts fairs the past fall. The result of the trial was that the planting of fair-sized whole potatoes was the most satisfactory in result. This was true not only of a single kind, but was the average of 128 different kinds, treated exactly alike except in the form or cutting of the seed. In productiveness alone, the seven leading varieties stand in this order: American Giant, Burrough's Garfield, Cheeseman's Seedling, Riker's Graft, Chief, Beauty of Hebron, O. K., Mammoth Prolific. In greatest number of merchantable tubers, this is the order of preference: Farina, Blush No. 2, Chicago Market, Defiance, Beauty of Hebron, Rural Blush, Burrough's Garfield, Adirondack. Of the varieties in these lists, these are objectionable because rough and of bad shape: Chicago Market, Burrough's Garfield, Adirondack, American Giant (rather deep eyes), Cheeseman's Seedling, Defiance. And this leaves as favorably recorded on account of gross productiveness and merchantable in regard to both quantity and condition, the Beauty of Hebron only.

"The Beauty of Hebron, all in all, is the best potato grown. This was the general verdict of the meeting. The potato election in the Homestead last spring had the same result."

RESULTS FROM PLANTING DIFFERENT AMOUNTS OF SEED ON COLLEGE FARM.

1. The question is often asked, in planting potatoes, what amount of seed will give the best returns in yield and quality.

Potato growers differ greatly in their views,—from a single eye to each hill to a whole potato.

I am of the opinion, however, that most of the tests made indicate that when potatoes are cut to about three eyes to the piece, and one piece planted in a hill, the yield and quality will be better than with a greater or less amount of seed.

2. Desiring to add our mite, in determining this question, five plats of potatoes were planted on June 2, 1885, of the Burbank variety.

The soil was a sandy loam, well adapted to potato culture. No fertilizers were used except a dressing of well-rotted barn-yard manure, which was plowed under. The plats were put in good condition, rows three feet apart, and potatoes planted eighteen inches apart in row.

During the season of growth the soil was thoroughly cultivated and kept free from weeds.

3. The following notes give the appearance of the vines and other items of interest during the growing season, while the table gives the number of plats, amount of seed, date of planting and digging, weight of large and small potatoes, total weight of each plat, per cent of small potatoes.

NOTES ON POTATO EXPERIMENTS.

June 25. Those from one eye are very thin. Did not come up as well as the others. There are from one to two stalks in a hill. Those from two eyes are larger and not so thin; but not so large as those from more seed. From three to five stalks in a hill. Those from three eyes are making good strong growth, with from five to eight stalks in a hill. Those from one-half of a potato are making rank growth, having tops nearly as large as those from whole potatoes. Those from whole potatoes present the largest growth, having from five to ten stalks in a hill. The tops are not as rank as some of the others; they are long and slim.

June 30. Vines from whole potatoes are largest; and from one eye the smallest.

Those from one eye do not spread out so much.

July 7. Same as last observation.

July 14. Those from whole potatoes and those from half are nearly same in growth. Those from one eye are large, but there are only two or three stalks in a hill.

The vines from three eyes are very strong, making vigorous growth.

Observations were taken at various times during the season, but there were no apparent changes from condition referred to in these notes.

The table gives the results so far as yield is concerned. There was very little difference as regards the quality. The potatoes from whole seed were not quite as smooth as those from a less amount of seed. They grew more rough and scraggy than the others. The table indicates that three eyes in

a hill gave the best results as to quality and quantity of *large marketable* potatoes:

*No. of Plats.	Date of Digging.	Amount of Seed in each Hill.	Weight of Large Potatoes, lbs.	Weight of Small Potatoes, lbs.	Total Weight of Potatoes, lbs.	Per Cent of Small Potatoes.
Plat 1	Oct. 17	1 Eye.	84	20	104	19
Plat 2	" 17	2 Eyes.	104	40	144	28
Plat 3	" 17	3 Eyes.	152	34	186	18
Plat 4	" 17	½ Potato.	140	42	182	23
Plat 5	" 17	1 whole Potato.	130	58	188	31

* Potatoes were planted June 2.

We intend to continue this experiment through a series of years.

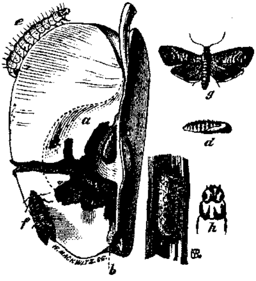
SAM'L JOHNSON,
Professor of Agriculture and Superintendent of the Farm.

AGRICULTURAL COLLEGE,
April 10, 1886.

NO. 14.—ENTOMOLOGICAL DEPARTMENT.

THE CODLING MOTH AND BARK LOUSE.

CODLING MOTH. Carpocapsa pomonella Linn.—This insect, though so well known as a larva—the "apple worm"—is not familiar even to many of our wisest fruit growers in its mature or moth state. Hence the desirability of a brief description of its size, markings and habits, even in a paper written wholly to give practical instruction to practical folks.



(Fig. 1.)

The moth (Fig. 1, *f and g*) is accurately represented in the figure, in form and size. The main color is gray flecked with darker dots and bars,

and with a characteristic copper colored spot at the end of its front wings. This spot will always enable one to distinguish this moth. Every apple grower should put wormy apples in a small box and rear the moths, that there may be no doubt about the species. In May, about two weeks after the blossoms appear, the female moth commences to lay eggs in the calyx of the blossoms (*Fig. 1, b*). These soon hatch, when the minute larva (shown full grown, Fig. 1, *e*) eats into the apple and feeds upon the pulp about the core, filling the space with its fecal filth.

Some good observers argue that a single larva feeds in several apples. While it is hard to prove that this may not be true, I am sure that it is not always the case, and from my observations and experiments I have been led to believe that it was exceptional if ever true. One wormy apple placed with several others in a box has always remained the only one injured. Again, I have several young trees which only bear a few apples; in early fruit, I have found one, two or three apples on a tree attacked late in June, each containing a full grown larva, while the few others near by would all be sound. And yet the apples injured, and which still contained the full grown larva, seemed to be no more eaten than those usually found with the mature "worms" in them. Here each certainly fed on a single fruit, and as it would be safer for the larva to confine its attacks to a single apple, I have been led to wonder if it were not a mistake to argue that they generally migrate to different apples.

These spring moths continue to come from cellar or apple house till July. I have taken such moths July 4th on the screen of my cellar window. The whitish larvæ attain their full growth in about four weeks. This period will be lengthened by cold and shortened by heat. When mature the larva leaves the apple, which may have fallen to the ground, and seeks a secluded place in which to spin its cocoon (Fig. 1, *i*) and pupate. The pupa or chrysalis (Fig. 1, *d*) is much like those of other moths. The pupæ of the June and July larvæ are found in the cocoons soon after the latter are formed, while those of the autumn larvæ do not pupate till spring, but pass the winter as larvæ in the cocoons. The eggs of the second brood are laid in July, August and September. The larvæ feed in autumn and often till mid-winter, while as just stated they do not pupate till spring.

REMEDIES.

As this is by far the most injurious pest of the apple, it should be widely known that we have a very satisfactory remedy.

The old method of bandaging failed signally, as it required careful attention right in the busy season, at intervals of from ten to fifteen days. This was neglected and so the method was a failure. A better method was that *of pasturing hogs in the orchard, which would eat the wormy apples, as* soon as they fell, and thus save the fruit, and kill the insects. This remedy was imperfect, as many larvæ left the apples before they fell from the tree, and so of course escaped. To render this practice effectual, the orchardist must fell the wormy apples to the ground, before the worms leave them. As the mound of filth at the calyx end—which as the apple grows will hang down—shows which apples are wormy, it is not very difficult, with a forked stick, to remove all wormy fruit. This not only makes the hog remedy quite perfect, but also thins the fruit, which insures much finer apples.

Another so-called remedy which finds space in the papers each year, is to

attract these moths to liquids, either sour or sweet, which are placed in vessels suspended in the fruit trees. It is stated that sour milk and sweetened water will lure scores of these moths and drown them. This remedy, like that of attracting these moths by fires in which they will be burned, is entirely worthless. I have tried both repeatedly, and with not a shadow of success.

SPRAYING WITH THE ARSENITES.

By far the best remedy for this codling moth, is to use either London Purple or Paris Green. The remedy is not only very efficient, but is also easy of application, and not expensive. I have now tried this thoroughly for six years, and in each and every case have been more than pleased with its excellence. Enterprising fruit growers of New York, Michigan, and *other States have also tried it and are as loud in its praise as I am. Indeed,* I know of no one who has tried it in vain.

I have found London Purple just as effective as Paris Green, and as it is cheaper, and rather easier to mix in the water, is to be preferred. White arsenic will serve as well, but from its color it is apt to be mistaken for some other substance, and may thus in the hands of the careless do great harm, and perhaps even destroy human life.

I mix the powder one pound to fifty gallons of water. It is best to wet the powder thoroughly and make a paste before putting it into the vessel of water, that it may all mix, and not form lumps. For a few trees we may use a pail, and Whiteman's Fountain Pump, always keeping the liquid well stirred. One common pail of the liquid will suffice for the largest tree. A teaspoonful of the poison is enough for a pailful of water. For a large orchard, common barrels should be used, and drawn in a wagon. I prefer to have the barrels stand on end, with a close movable float, with two holes through it, one for the pipe or hose from the pump and the other for a stirrer. If very large orchards are to be treated a good force pump should be fastened to the barrel. *In western New York the handle of the pump is attached to the* wagon wheel, so that no hand power is required other than to drive the team and manage the pipe which carries the spray. The spray may be caused by a fine perforated nozzle or a cyclone nozzle. The finer it is the less liquid will be required. *The important thing is to scatter the spray on all the fruit,* and get just as little on as possible. The larva is killed by eating the poison, and we find that the faintest trace suffices for the purpose. Again, the poison should be applied early, by the time the fruit is the size of a small pea. I have found one such application to work wonders. There is no doubt but that the first application, followed by one or two others at intervals of two or three weeks, would be more thorough, yet I have found one application, made early, so effective, that I have wondered whether it is best or necessary to make more than one application. I do think, however, that it must be early. In May and June the calyx of the apple is up, and so the poison is retained sufficiently long to kill most all of the insects.

One more count in favor of this treatment, is the further good we receive by killing the several phytophagous larvæ that attack the foliage of the apple at this early period when defoliation is so harmful. Thus the terrible canker-worm, the several destructive leaf rollers which even eat out the very buds, and that old pest, the tent caterpillar, are all made to bite the sod. Very likely, too, the plum gouger which so deforms the apple in Wisconsin may also find in this remedy its death warrant.

The danger from this practice I have proved to be nothing at all. The microscope and chemical analysis have both shown that all the poison has *been removed long before we wish to eat the fruit.* The wind no less than the rain helps to effect this removal, as I have shown by putting the poison on plants sheltered from all rains. Of course we should not turn stock into an orchard till a heavy rain has washed the poison from all herbage under the trees.

I am entirely positive that a knowledge and practice of this remedy throughout our country will save hundreds of thousands of dollars to our fruit growers. It will serve to give us the fair, perfect apples known to our fathers, but which have become lamentably scarce in our modern orchards.

THE APPLE TREE BARK OR SCALE LOUSE.

In many parts of our State the Apple Scale or bark louse is very common and destructive. This is often called the Oyster Shell Bark Louse and is known in science as *Mytilaspis pomorum Bouché.*

Fig. 2

Fig. 2 and Fig. 3, 7 show the scales as they appear from August to June. Under these scales at this time, from late summer till the following June, will be found scores of small white eggs. (Fig. 3, 1) which resemble white powder, unless magnified.

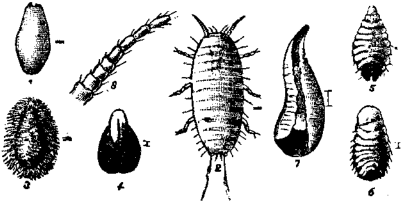


Fig. 3—Much Magnified.

Early in June these eggs hatch, and the minute yellowish lice (Fig. 3, 2) will be seen scattered about the trunk and branches of the tree. Soon they insert their beaks into the bark, sometimes into the skin of the fruit, and commence to suck the sap or juice. They now grow rapidly, and secrete a waxy, fibrous substance which forms the growing scale, (Fig. 2, 3, 4, 5, 6) which will be fully developed by August, when the many white eggs will *again be laid under the protecting scale,* where, unless eaten by some parasite or mite, etc., will remain in safety till the coming June.

It seems strange that these small, almost microscopic, insects can do so much injury, as they often entirely destroy large, vigorous trees. Yet when we consider their numbers—often millions, which almost cover the bark of the tree (Fig. 2), it does not seem so strange. The scales of the male lice are rarely seen. They are found on both sides of the leaves, and are more symmetrical than the female scales. The males have two wings.

REMEDIES.

Parasites, Mites, and Lady Beetles all prey upon these fell destroyers, but though efficient aids, they are not always enough to exterminate the lice,

and then the trees fall victims to these ruthless suckers. I have seen trees in all parts of our State thus enfeebled or destroyed.

The old remedy, soft soap, or a strong solution of the same, will surely vanquish this enemy if it is applied to the trunk and main branches in early June and again three weeks later. I have proved the efficacy of this treatment over and over again. The trees at once put on new vigor, and in a short time only dead lice could be found. To apply this specific I know of no better way than to use a cloth and scrub by hand. To be sure we can, if dainty, use a brush like a shoe-brush, but I like to go at it with a good cloth, when, with sleeves rolled up, I make pretty sure that no louse escapes. If this carbolic acid solution is used, caution is required that we do not sprinkle the foliage, or the leaves will be killed.

For the past few years I have changed the substance by adding crude carbolic acid, which I think improves it, especially if but one application is to be made; and we know that at this busy season the second application is apt to be neglected.

I heat to the boiling point one quart of soft-soap to two gallons of water, and while still hot thoroughly stir in one pint of crude carbolic acid. This may be applied as before. This carbolic acid mixture retains its virtue, I think, longer than does the soap alone, and so is especially desirable when but one application is to be made, as described above.

Like the arsenites, so this carbolic acid and soap mixture is of triple value. Not only does it kill the dreaded lice but it also keeps off the borers, which are also serious pests in the orchards of Michigan. The old borers, *Saperda candida*, and *S. cretata*, are quite common and destructive in our State, while the Big-headed Borer, *Chrysobothris femorata*, is even more prevalent and harmful. I have demonstrated beyond question that these enemies are surely kept away by the same treatment, applied at the same time for which we use it to ward off the scale lice. No wonder, then, that our trees put on such new life and vigor after this annual scrubbing.

In each of these remedies, then, not simply two but several birds are killed by the self same stone. It is to be hoped that many of our fruit growers will throw it, and thus secure fairer fruit, and save much to our State.

A. J. COOK,
Professor of Zoology and Entomology.

AGRICULTURAL COLLEGE, May 1, 1886.

No. 15.—CHEMICAL DEPARTMENT.

MANURIAL VALUE OF ASHES.

The value of ashes for manure is a subject of inquiry among farmers and fruit growers, and has given rise to so large a correspondence with this Department that I have concluded to group my answers into one general reply in the form of a bulletin.

Tables of analyses of the ashes of plants of great scientific value can be found in the books, especially in Prof. Johnson's "How Crops Grow;" but the very nicety of these analyses, and the careful exclusion of all foreign and accidental substances usually present in ashes as we find them on the farm or at the factory, render such analyses of less practical value to the farmer and

fruit grower. A quantity of sand and earthy materials adhering to the fuel, of charcoal, etc., is found in ashes made in the usual way, and some allowance must be made for these in estimating their real value. A careful exclusion of all such foreign materials would give greater scientific accuracy to the analysis without adding materially in making an estimate of thoir value as they were usually found. It is a matter of scientific interest to note the differences in the composition of the ash of different kinds of trees; of the ash of the body wood as compared with that of the branches of the same tree; of the ash of the bark, etc. But when body-wood, limbs and bark are all reduced to ashes in the stove or furnace, with some accidental dirt present, the farmer wants to know the value of such ashes just as he finds them.

So in the case of leached ashes, he cares less to know what is the value of ashes from which every trace of soluble materials has been removed by prolonged exhaustive treatment with water, than to know what is their value when leached in the ordinary way and thrown out when further leaching does not pay.

In selecting specimens of ashes for analysis I have aimed to secure representative specimens directly from the stove, furnace, ashery, etc., in the condition in which the buyer would find them. The *market* condition rather than the *scientific* condition has been the object in these selections.

ESTIMATE OF VALUE.

In making an estimate of the cash value of ashes I call potash worth five cents a pound; insoluble phosphoric acid, 5 cents a pound, and the mixed carbonates of lime and magnesia one-eighth of a cent a pound, because these materials would cost these sums if purchased separately at wholesale rates in the open market.

Some may ask, why place a value on ashes any more than on any other waste product? The answer is that when these materials are used with skill on farm or orchard, they pay the cost and leave a profit besides in the increased production and improved quality of the crop.

When we consider how large an amount of vegetable matter is represented by a small amount of ash, the value of wood ashes for manure becomes evident. Thus only ten pounds of ash remain from the combustion of a cord of hardwood, and only five pounds from a cord of soft wood. One hundred pounds of ash represent the mineral matter of 85 bushels of wheat, 85 bushels of corn, or a ton of timothy hay. Eleven tons of gooseberries, grapes, blackberries, peaches or apples would each contain only 100 pounds of ash. Seven tons of cherries, plums or raspberries contain only 100 pounds of mineral matter.

This gives some idea of the large amount of farm or orchard produce which will be represented by a small weight of mineral matter. But small as is the amount of ash, it is still indispensable for the production of these crops, and must be present in the soil in available form before profitable cultivation is possible.

Let it not be supposed that the ash in all these crops is identical in composition. The ash of each class of plants has a composition peculiar to itself, and differing in some respects from that of other classes; yet there is a certain similarity in the ash of all cultivated plants. When the ashes of vegetable substances are served up for any plant by mixing them with the soil, such plant does not of necessity order every dish on the bill of fare, but

selects such materials and in such quantities as are adapted to its wants, and leaves the balance for some future meal or some other guest.

If any soil is naturally deficient in any of the ash constituents, or has been impoverished by excessive cropping, the restoration of these materials in the form of wood ashes appears to be the natural and safe process because they contain all the minerals of vegetable growth.

KINDS OF ASHES AND THEIR VALUE.

Hard-wood ashes were taken from my kitchen stove, the fuel being a mixture of beech and hard-maple. Small fragments of charcoal were scattered through the ashes and a little sand from dirt adhering to the wood. Ninety-three per cent was soluble in dilute hydrochloric acid, the potash constituted 12¼ per cent., and phosphoric acid 6 per cent. One hundred pounds are worth $1.00.

I have just received a letter from a very intelligent fruit grower in which he says: "I can get pure, dry, hard-wood ashes at $3.20 per ton here—and the same mixed with fish offal, half and half, at $5.00 per ton. Which is the best for pears, apples, grapes and berries, 'Fine Raw Bone' at $38 or the pure ashes, or ashes and fish offal?"

My answer is, "Whatever you neglect to buy, do not fail to buy all the hard-wood ashes your means will allow or your land needs when you can get them for $3.20 a ton. If a man offers to sell you gold for the price of silver, buy the gold and sell it not!"

Leached ashes were taken from an ashery in Lansing, the leaching having been carried as far as was profitable. Eighty-nine per cent. soluble in acid. The potash was 1.6 per cent. and phosphoric acid 6.8 per cent. Value of 100 pounds, 52 cents.

If leached ashes are of enough value to be bought in car lots in Michigan and carried by rail to Buffalo to make commercial manures for Michigan farmers, then they are valuable enough to be used as manure at home, where they cost little or nothing, and the expense of double transportation is saved.

Soft-wood ashes were obtained from the ash-pit of the furnace of a planing mill in Lansing, being the ashes from planings of pine, hemlock, fir and basswood lumber, with some soft-coal ash mixed in. It represents the ash from saw mill and planing mill furnaces. Fifty per cent. of the ash was soluble in acid, and so much soluble silica was in the ash that, when treated with acid, it formed a jelly-like mass of precipitated silica; the ash contained 12 per cent. potash and 4 per cent. phosphoric acid. One hundred pounds are worth 84 cents.

Corn-cob ashes were obtained by burning cobs in the open air. Seventy per cent. soluble in acid; the potash is 45 per cent., and phosphoric acid 4½ per cent.

Value of 100 pounds, $2.50.

Tannery ash was obtained from the furnace of a tannery in Lansing, where spent tan and some soft coal were used for fuel. In gathering the specimen an effort was made to exclude the coal-ash as far as possible. Forty-five per cent. of the ash was soluble in acid; the potash was 2½ per cent., and phosphoric acid 1.2 per cent. The prolonged steeping of the tan-bark appears to have extracted some of the potash and phosphoric acid.

Value of 100 pounds, 22½ cents.

Soft coal ash was obtained from the furnace in the Laboratory, where bitu-

minous coal is used for fuel. A small amount of wood ash was present from wood kindlings used in starting the fire.

Eighteen per cent. soluble in acids; the potash was one-fifth of one per cent., and phosphoric acid one-seventh of one per cent. A trace of lithia in the ash. The insoluble residue—82 per cent.—consists of silica and insoluble silicates. The small amount of valuable manurial materials present come in part from the wood kindlings. Soft coal ashes have very little value for manure.

Value of 100 pounds, 2 cents.

Hard coal ashes were obtained from the anthracite burned in a stove in the Laboratory. Four and one-half per cent. soluble in acid; potash found to the amount of one-tenth of one per cent., and phosphoric acid one-twentieth of one per cent. The soluble part contained a small amount of sulphate of lime.

The insoluble part, 94½ per cent., consisted of clay and other insoluble silicates. Estimated by its chemical analysis, one hundred pounds of hard-coal ashes are worth less than one cent. It contains less plant food than the same amount of common clay. Its value for most purposes springs from its physical properties. It is a good absorbent, and well adapted to use in earth closets; makes good roads and walks, and would make a good filling for hollow wall-space to prevent the passage of heat. Two parts of sifted coal ashes and one of common salt, moistened with water, will make a good cement to close open cracks in stoves or furnaces. But as a source of plant food, hard-coal ashes are without value.

For purposes of direct comparison I submit the following table of results of analysis:

TABLE OF ANALYSES OF ASHES.

	Hard-wood Ashes.	Leached Ashes.	Soft-wood Ashes.	Corn-cob Ashes.	Tannery Ashes.	Soft-coal Ashes.	Hard-coal Ashes.
Soluble in hydrochloric acid	93.00	89.00	50.00	70.00	45.00	18.00	4.50
Insoluble in hydrochloric acid	7.00	11.00	50.00	30.00	55.00	82.00	94.50
Potash (K_2O)	12.25	1.60	12.00	45.00	2.50	.20	.10
Phosphoric acid (P_2O_5)	6.00	6.80	4.00	4.50	1.20	.14	.05
Salts of lime and magnesia	70.00	74.00	32.00	20.00	41.00	5.00	2.50
Value per ton (2,000 lbs.)	$20.00	$10.40	$16.80	$50.00	$4.50	$0.40	$0.16

SOILS MOST BENEFITED BY WOOD ASHES.

Discarding ashes of mineral coal as valueless for manure, I may say in general terms that the ashes of wood and of land plants of every kind are of value for manure on every kind of soil which has been reduced by cropping; but the greatest benefit is shown upon sandy and porous soils. On these "light soils" crops of every kind, but especially root crops and corn, will be benefited by a dressing of wood ashes. Fruit trees and fruit-bearing plants having a woody structure, will be benefited by wood ashes.

Thirty to fifty bushels to the acre of fresh ashes will be a full dressing, and three or four times that amount of leached ashes may be applied with permanent benefit.

R. C. KEDZIE,
Prof. of Chemistry.

AGRICULTURAL COLLEGE,
June 1, 1886.

No. 16—BOTANICAL DEPARTMENT.

REPLIES TO QUESTIONS ABOUT GRASSES.

It may be generally known that the last Legislature passed an act whereby the writer should be one of six professors of the Agricultural College, each one of whom should prepare two bulletins a year. In the present case, no provision was made for defraying any expenses for making experiments. With no assistant, the care of a botanic garden, an aboretum and the large increase of students who attend the college and study botany, little time has been found for original investigation. Most of the results of former experiments in this direction have been given in lectures at farmers' institutes and reports to the Board of Agriculture.

This explanation seems to be in order as a partial excuse for selecting the above subject for the present bulletin.

The relation and uses of the Botanical Department of the Agricultural College to the people of the State have been explained in several former reports, and in the reports of the State Horticultural Society.

At different times during the past twelve years, we have had large numbers of plats of grasses and clovers. Lectures, reports, and notes for the press, have called attention to these experiments. Add to this the great importance and difficulty of the subject, making it impossible for any one except a botanist to recognize many grasses, inquiries have been frequent.

The Department could be of still greater benefit to the farmers, if there were provisions made for using it. Here seeds of various sorts could be tested for purity, vitality, and freedom from weeds. For example, a plan might be followed similar to one adopted by the members of the Royal Agricultural Society of England. They employ a consulting botanist, who, for a small fee, examines farm seeds, especially those of grasses and clovers, before they are purchased by members.

The amount of work of the consulting botanist of England has rapidly increased, and the seeds sold in the market have very materially improved in regard to the points above mentioned.

PHLEUM PRATENSE. TIMOTHY.

A Professor of Agriculture in another State, and others, want to know if Timothy blossoms twice.

Answer.—On a certain day a few flowers open and close, not to open again. On each succeeding day, for six to ten days, depending on the weather, other flowers open and close. During the middle of this flowering period most of the flowers open. Fewer blossom on the first and on the last days than on any other day.

"In Dakota, Timothy dries up, and produces a very light crop," says an inquirer. "What would you try?"

I. M. S., Otsego Co., asks the same question, and wants to know what to do. Replies appear in what follows.

DACTYLIS GLOMERATA. ORCHARD GRASS. COCK'S FOOT.

Every little while specimens arrive, and questions are asked.

Answer.—This is a native of Europe, a nutritious, early grass, much prized

for pasture, and in many places for meadows. It flowers with early red clover, is rather coarse, and speedily becomes ripe and wooly after flowering. It grows in tufts, unless sown at the rate of about two bushels of seed in the chaff to the acre, or mixed with other grasses or clovers; it is a perennial, and not easily killed by feeding or mowing. It is one of the most promising for trial in northern Michigan and in Dakota, as well as in many other places. It does not spread like quack grass, and is not hard to kill by cultivation. It thrives very well in shady places Orchard grass is especially suited to deep, rich loam, but not to stiff, cold clay, or very thin soils.

ARRHENATHERUM AVENACEUM. TALL OAT GRASS. (*Avena Elatior.*)

Various inquiries have been made. This comes from Europe, where it does not usually rank as high as some of the finer grasses.

Tall oat grass is a very vigorous perennial, starting early, usually making a large growth for meadow or pasture. It is rather bitter, but stock eat it well if not allowed to get too far advanced before cutting. Like orchard grass, it should not stand one day after flowering, if good hay is any object. This is very suitable in many places west, north and south to mix with early red clover and orchard grass. Most people who have tried it in our State report favorably. This is inclined to grow in tufts, and does not spread like quack grass. It is well worth trying on the light soils of northern Michigan.

FESTUCA ELATIOR. TALL FESCUE. MEADOW FESCUE.

I. P. M., Penn., says this grass comes up luxuriantly, and thrives in the shade of trees. He would like to know whether to make it welcome, or begin an extermination. This comes from Europe, where it has long been highly esteemed for pasture and meadow. Like the two preceding, tall fescue grows in tufts, unless thickly sown. In quality it ranks high. The plants start early in spring, whether they come from seed or old stubble. This is liked in many places, and is especially worthy of trial in northern and southern Michigan. It is adapted to loam, but will thrive on any good soil.

SHEEP'S FESCUE. (*Festuca ovina.*)

This is often inquired about, but hardly merits attention on account of its small size and tufted habit.

BUFFALO GRASS.

There are many species of western grasses which are popularly and indiscriminately called by this name. They are all small and few, if any, stand well the tramping of close pasturing. Inquiry was made in reference to trying them in northern Michigan. Those named above are more promising for that country.

ALOPECURUS PRATENSIS. MEADOW FOXTAIL.

At the first glance, when in flower, this grass is often mistaken for Timothy, but it blooms about four weeks earlier, the spikes are shorter, broader, and much softer, and the whole plant is smoother. In plats it attracts much attention.

The plants from seed require a couple of years to get well established. The seed is light, and often poorly filled. It is a perennial from Europe, where it is highly esteemed in mixtures for permanent pasture and meadow. Meadow

foxtail is not well adapted to alternate husbandry, but is excellent for permanent pastures in moist climates. It starts very early in spring, and is well worth a trial in the richer parts of northern Michigan.

SORGHUM HALAPENSE. JOHNSON GRASS.

This is a rather tall, coarse grass, introduced into the south, where the best judges are agreed that on rich land nothing surpasses it for permanent meadow. The rootstocks are large and juicy, and fill the ground like quack grass. At the north, it starts too late and makes too thin a growth to be of value; moreover, the plants are more or less killed by the winter, unless well mulched with snow or something else. It does not seem possible that it can be of any use in Michigan. Inquiries have often been made, in reference to habits and uses. Seeds ripen at Lansing.

CYNODON DACTYLON. BERMUDA GRASS.

This foreign grass seldom seeds in the United States, but spreads rapidly after the manner of June grass by stout rootstocks. It loves the sun and heat and is one of the very best grasses for pasture and hay in warm climates. It is propagated by planting pieces of the rootstocks, which soon fill up the intervening spaces. At the Agricultural College, the habits of this grass have been carefully studied for several years, where it has never failed to pass the winter, though sometimes partially killed. It spreads slowly, in some places holding its own or even gaining on June grass ; starts late in spring, and is killed back to the ground by the first frost. It does not seem to be worthy of attention in any part of Michigan.

POA PRATENSIS. JUNE GRASS. KENTUCKY BLUE GRASS. BLUE GRASS.

Although answers have been repeatedly given to inquiries about this native grass they keep coming in. This is, perhaps, our most common grass found in old pastures or by the wayside. On poor land, or in dry seasons, the flower stalks seldom exceed a height of ten inches, while on rich land it not unfrequently grows four feet high. The quality is excellent, as is well attested by the famous pastures of some parts of Kentucky and of other States. It is one of our best grasses for lawn and for pasture, and is too well known to need a further notice. It must not be mistaken for flat-stemmed poa, also called *wire grass* or *blue grass*. This latter is seldom purposely sown, as the growth is late, thin, and slow ; still the quality is unsurpassed.

POA SEROTINA. FOWL MEADOW GRASS. FALSE RED TOP.

This native grass is very common on bottom lands in connection with red top which is rather more abundant and better known. Like the two preceding species of *Poa*, this one also is of excellent quality for hay or pasture. The panicle is long, loose, and flexible, the stems a little weak, and inclined to lodge. It is very palatable, even after going to seed. The flowers appear in July, about the time of the blossoms of red top. It is one of the best for marsh-land meadows, but is not so well adapted for pasture. It deserves more attention than it has received by the farmers of our State. Specimens, with inquiries, have come from several distant States as well as from our own.

AGROSTIS VULGARIS. RED TOP. HERD'S GRASS OF PENNSYLVANIA.

This varies much in color and habit and seems to shade off into *A. stolonife*

or *A. alba*, known as *creeping bent* or *fiorin*. It is excellent for marsh lands, whether needed for pasture or for hay, and is very suitable for lawns sown alone or with June grass.

A. CANINA. RHODE ISLAND BENT

is smaller than the former, which it much resembles in many respects. The seeds of these are much mixed. The latter is a favorite for lawns.

Inquiries about the species of *Agrostis* are common.

DEYEUXIA (*CALAMAGROSTIS*) *CANADENSIS*. *BLUE JOINT*.

This tall, native marsh grass is usually called *blue joint* by people in Michigan and eastward, though half a dozen or more distinct sorts pass by this name as we go westward. This one flowers by the middle of July, when it will cut a heavy crop of very good hay. It is suitable to mix with red top and fowl meadow grasses for low lands.

PHALARIS ARUNDINACEA. REED CANARY GRASS.

This is a native in wet places and somewhat resembles the preceding. The top is six inches long and quite narrow, the stems are firm and the leaves harsh, the whole making rather poor hay. It is the original of our striped or ribbon grass found in cultivation.

MUHLENBERGIA GLOMERATA.

Frequent inquiries are made in regard to this native grass, which is found on marshes, where it flowers in August. The stems are about two feet high, wiry, erect, leaves thin, top about one-half by three inches, and usually tinged with purple. In various sections of the United States farmers have given it different common names. Where it is found in abundance, the hay bears a high prize for feeding horses. There are four other species of Muhlenbergia with a more branching habit, common in Michigan, some of them found on dry land and all flowering late.

VANILLA GRASS. (*Hierochloa.*)

Comes occasionally for a name on account of its fragrance, much resembling that of sweet vernal grass. It is apparently of little value for pasture or hay. The panicle is of a brown color.

RICE CUT GRASS. (*Leersia.*)

Grows in ditches, and cuts the fingers with its stiff, hooked prickles, which also serve to help to hold up the tall stems by hooking on to other plants. The leaves are sensitive, and close up when rubbed between the thumb and finger. An interesting grass, but of no agricultural value.

ANDROPOGON FURCATUS. FINGER GRASS.

This native is sometimes called *blue stem*. It grows four to six feet high, has a woody stem, and flowers late. In the east it is not considered of much account, but on the dry plains of the west it is valued for hay.

Other grasses of less importance are sent for name or other information, such as burr grass, wild barley, some of the weeds of the grass family, the small annual variety of *sweet vernal grass*, *wild oats*, etc.

A western professor sends one hundred and fifty bunches of grass for name;

others want a list which promises well for Missouri, Dakota, Kansas, Indiana, Illinois, or Michigan; others ask for those most suitable for marshes, the names of which are noted above.

A man in Illinois is told to try June grass if he desires a grass to keep the banks of a ditch from washing, and at the same time wants one which will not choke the ditch.

Seeds of June grass are sometimes sent to Germany, where they are sold as *Poa trivialis*, rough stalked meadow grass. Some of them come back to Michigan Agricultural College for identification after passing through a seed station in Germany, and one in New England.

Mixed lawn grasses are beginning to come in since our bulletin was issued stating that June grass and red top were the best and only grasses needed for most lawns.

Some ask what permanent grasses will thrive best in an orchard or in a grove. Orchard grass and June grass are named for this purpose.

Grass seeds from this college have been sent for trial to the Agricultural colleges of six other States.

WHEAT AND CHESS.

Large numbers of specimens have been sent, and several have been brought by persons to show that wheat will turn to chess. So far, each one has failed in every attempt. In brief, all the cases so far seen can be summed up as follows: A chess root ran into an old hull of wheat, which was pulled up with the chess plant; bunches, or plants of wheat and chess, were closely interwoven by the roots and lower stems, but with no connection; the top part of a chess plant had been pulled out, and one of wheat, cut off, and crowded down in its place; a panicle of chess had been crowded down into the upper sheath of a plant of wheat; some small portions of a panicle of chess had been purposely or accidentally broken off and clasped by the chaff of a spike of wheat.

W. J. BEAL,
Professor of Botany and Forestry.

AGRICULTURAL COLLEGE, MICH.,
July 15, 1886.

MICHIGAN STATE AGRICULTURAL SOCIETY.

PROCEEDINGS AND REPORTS FOR THE YEAR 1885.

OFFICERS FOR 1885.

PRESIDENT — E. O. HUMPHREY, Kalamazoo.

TREASURER — A. J. DEAN, Adrian.

SECRETARY — J. C. STERLING, Monroe.

EXECUTIVE COMMITTEE.

Terms expire January, 1887.

WM. BALL, Hamburgh, Livingston Co.
JNO. C. SHARP, Jackson, Jackson Co.
A. O. HYDE, Marshall, Calhoun Co.
W. H. COBB, Kalamazoo, Kalamazoo Co.
E. W. RISING, Davison Station, Genesee Co.
I. H. BUTTERFIELD, JR., Lapeer, Lapeer Co.
JOHN LESSITER, Jersey, Oakland Co.
W. CHAMBERLAIN, Three Oaks, Berrien Co.
J. P. SHOEMAKER, Amsden, Montcalm Co.
M. J. GARD, Volinia, Cass Co.

Terms expire January, 1886.

ABEL ANGEL, Bradley, Allegan Co.
D. W. HOWARD, Pentwater, Oceana Co.
H. O. HANFORD, Plymouth, Wayne Co.
F. L. REED, Olivet, Eaton Co.
A. F. WOOD, Mason, Ingham Co.
F. V. SMITH, Coldwater, Branch Co.
J. Q. A. BURRINGTON, Tuscola, Tuscola Co.
M. P. ANDERSON, Midland City, Mid. Co.
JOHN GILBERT, Ypsilanti, Washtenaw Co.
C. W. YOUNG, Paw Paw, Van Buren Co.

EX-PRESIDENTS.

M. SHOEMAKER, Jackson, Jackson Co.
JAMES BAILEY, Birmingham, Oakland Co.
W. J. BAXTER, Jonesville, Hillsdale Co.
GEO. W. GRIGGS, Grand Rapids, Kent Co.
CHARLES KIPP, St. Johns, Clinton Co.
W. L. WEBBER, East Saginaw, Saginaw Co.
GEO. W. PHILLIPS, Romeo, Macomb Co.
HENRY FRALICK, Grand Rapids, Kent Co.
PHILO PARSONS, Detroit, Wayne Co.

STANDING COMMITTEES.

Business Committee.—W. H. COBB, Kalamazoo; A. O. HYDE, Marshall; JOHN C. SHARP, Jackson.

Committee on Transportation.—J. M. STERLING, Monroe; W. L. WEBBER, East Saginaw; W. J. BAXTER, Jonesville.

Committee on Finance.—M. P. ANDERSON, Midland; E. W. RISING, Davison Station; D. W. HOWARD, Pentwater.

Committee on Premiums.—WM. BALL, Hamburgh; I. H. BUTTERFIELD, JR., Lapeer; JOHN LESSITER, Jersey; W. H. COBB, Kalamazoo; A. F. WOOD, Mason; A. O. HYDE, Marshall; H. O. HANFORD, Plymouth.

Committee on Rules.—WM. CHAMBERLAIN, Three Oaks; A. J. DEAN, Adrian; GEO. W. PHILLIPS, Romeo.

Committee on Reception.—PHILO PARSONS, Detroit; WM. L. WEBBER, East Saginaw; W. J. BAXTER, Jonesville.

Committee on Programmes.—A. O. HYDE, Marshall; I. H. BUTTERFIELD, Lapeer; G. W. PHILLIPS, Romeo.

Committee on Printing and Advertising.—A. J. DEAN, Adrian; J. C. STERLING, Monroe; CHARLES W. YOUNG, Paw Paw.

General Superintendent.—J. M. STERLING.

Chief Marshal.—A. O. HYDE.

EXECUTIVE SUPERINTENDENTS.

Cattle.—I. H. Butterfield.
Horses.—G. W. Phillips.
Sheep.—D. W. Howard.
Swine.—John Lessiter.
Poultry.—J. Q. A. Burrington.
Miscellaneous.—John C. Sharp.
Fine Arts.—W. J. Baxter and Jonathan Parsons.
Music.—M. P. Anderson.
Children's Department.—Miss Minnie H. Brow.
Needle Work.—Miss Minnie H. Brow.
Manufactures.—Henry Fralick and F. L. Reed.
Agricultural.—Amos Wood.
Machinery.—Wm. Chamberlain.
Farm Implements.—H. O. Hanford, Abel Angel and Charles W. Young.
Dairy.—J. P. Shoemaker.
Vehicles.—John Gilbert.
Bees, Honey, etc.—M. J. Gard.
Forage.—E. W. Rising.
Gates and Gatekeepers.—Wm. Ball.
Police.—W. H. Cobb.

MEETING OF THE LOCATING COMMITTEE.

KALAMAZOO, March 23, 188[illegible].

The Locating Committee met at 8 o'clock P. M., pursuant to the call of Chairman Cobb.

Present—President Humphrey, Messrs. Hyde, J. M. Sterling, and the Secretary.

The evening was spent in discussing the question of location, and a recess was taken until Tuesday A. M.

TUESDAY A. M., March 24.

The committee assembled, and proceeded to business.

Mr. Cobb offered the following:

WHEREAS, We deem it for the best interest of the Michigan State Agricultural Society and all concerned, that a settlement of ownership of property on the Kalamazoo Fair grounds be made before the location of the next Annual Fair is determined; therefore,

Resolved, That President Humphrey be authorized and requested to settle the point of ownership of property and buildings on the Fair grounds at Kalamazoo, with Col. F. B. Stockbridge (meaning property and buildings belonging to Col. Stockbridge according to contract, for the $4,000 paid by him in 1884).

Resolved, That President Humphrey be authorized to locate the fair for 1885, after having made such settlement.

The resolutions were adopted by the following vote: Ayes—Prest. Humphrey, Messrs. Cobb, Hyde, J. M. Sterling, Treas. Dean and the Secretary, 6; nays, 0.

Committee adjourned.

E. O. HUMPHREY, *President*.

J. C. STERLING, *Secretary*.

LANSING MEETING.

LANSING, June 8, 1885.

In pursuance of the resolution passed at the Winter Meeting of the Executive Committee, a meeting was held at the Hudson House, June 8.

President E. O. Humphrey in the chair.

The roll was called, and the following named members of the committee found present: Prest. Humphrey, Messrs. Rising, Hyde, Hanford, Ball, Lessiter, Cobb, Sharp, Gard, Wood, Chamberlain, Angel, Shoemaker, J. P., Howard, Gilbert, Anderson, Baxter, Phillips, Parsons, and the Secretary.

Mr. W. H. Cobb, Chairman of the Business Committee, reported that the committee had decided to erect a new building 32x100 feet for the Agricultural Department. The buildings and grounds are in good shape.

Mr. Cobb also reported that the Locating Committee had settled with Col. Stockbridge, agreeing what buildings, stalls, etc., should be left on the Fair grounds for the $4,000 subscription money paid by the citizens of Kalamazoo.

Report accepted.

Supt. Gilbert, of the Carriage Department, stated that buildings assigned to his department were not large enough to accommodate the exhibit.

Supt. Hanford, of the Implement Department, asked for a better water supply in that department.

The Printing Committee asked for instructions in reference to printing catalogues, and upon motion, were instructed to publish two thousand copies and to offer them for sale at ten cents each.

Upon motion the crop correspondents were granted free passes to the Fair upon same terms as previous years.

The exclusive right to sell candies on the Fair grounds was asked for, and upon motion the matter referred to the Business Committee.

An invitation to visit the Agricultural College having been accepted, it was voted to start from the hotel at 8:30 Tuesday morning.

Mr. James Turner invited the committee to visit his stock farm. Accepted with thanks.

Mr. Parsons referred to the death of Judge Wells and Mr. E. S. Moore.

On motion, Messrs. Parsons, Baxter and Chamberlain were appointed a committee to draft suitable resolutions upon the death of Judge Wells and Mr. Moore.

The committee subsequently reported as follows:

WHEREAS, God in his Providence has removed from our Executive Committee one of its oldest and brightest figures, in the person of the Hon. Hezekiah G. Wells, a man who, from the first organization of the State Agricultural Society, recognized its power for usefulness in stimulating, to the highest effort, the great farming interest of our State, and who, through all its varied history, never failed of personal concern in its annual fairs, or in any scheme that might promote the growth or development of the agricultural classes in influence and power. He gave his time and best efforts for nearly twenty years, without pecuniary consideration, to the work of placing, on a broad, firm foundation the Michigan State Agricultural College, which is accomplishing so much of present and prospective good to our farmers and mechanics, and exemplified in his own life and character the great American ideal of a wise, unostentatious and public spirited citizen; therefore

Resolved, That we, the executive committee of the Michigan State Agricultural Society, hereby express our sense of personal loss in his removal from our midst, which we deeply feel, and sincerely regret that we shall no more have the benefit of his wisdom in our counsels, or the pleasure of his genial presence in our annual meetings.

Resolved, that the secretary be and he is hereby instructed to prepare and forward to the wife of the deceased a copy of the preceding preamble and resolution.

(Signed) PHILO PARSONS,
W. J. BAXTER,
WM. CHAMBERLAIN.

Resolved, That we have heard with unfeigned sorrow of the death of Mr. Edward S. Moore, an intelligent and active member of this Board in its early days, a just and honorable business man, and one of the most practical and discreet farmers of Southern Michigan; a man who illustrated in his daily life and character the highest type of American manhood.

(Signed) PHILO PARSONS,
W. J. BAXTER,
WM. CHAMBERLAIN.

Report of the committee adopted by a unanimous vote.

The report of the committee on transportation was read and accepted.

Report as follows:

The G. R. & I. R. R., F. & P. M. R. R., and the C. & W. M. R. R. will carry stock and articles for exhibition free; passengers at half rates. Other railroads in the State will carry freight and passengers at half rates.

On motion the committee adjourned.

E. O. HUMPHREY, *President.*

J. C. STERLING, *Secretary.*

MINUTES OF MEETINGS DURING THE FAIR.

BURDICK HOUSE, KALAMAZOO,
Monday, Sept. 14, 1885.

The Executive Committee met at 8 o'clock, P. M.

President Humphrey in the chair.

Roll called: Present, Prest. Humphrey, Treas. Dean, Messrs. Butterfield, Phillips, Howard, Lessiter, Burrington, Sharp, Baxter, Anderson, Fralick, Reed,

Wood, Young, Hanford, Chamberlain, Angel, J. P. Shoemaker, Gilbert, Gard, Rising, Ball, Hyde, Parsons, and the Secretary.

Mr. Fralick moved and it was supported, that the annual election be held at the President's office on the Fair grounds. Carried.

Messrs. Dwight F. Smith, Jackson; Frank Little, Kalamazoo; O. H. Hilton, Paw Paw, were duly elected judges of election.

Mr. Will Terry, of Constantine, claimed to have mailed an entry on August 29, which had not been received by the Secretary. Mr. Crestal saw him mail the entry.

Mr. Baxter moved that the matter be put in form of an affidavit and the affidavit of the party who saw him mail the entry be taken and the entry then accepted. The motion prevailed.

It was voted to have published 5 000 catalogues of the Art Exhibit.

Moved and supported that a committee of five be appointed by the chair to draw up suitable resolutions of sympathy for Messrs. Sterling and Smith, who are absent on account of sickness.

The motion prevailed, and the chair announced as such committee, Messrs. Baxter, Fralick, Phillips, Dean, and Hanford.

The Committee subsequently reported as follows:

WHEREAS, Our old and valued friends, J. M. Sterling and F. V. Smith, are unable to attend the present State Fair; the first, by reason of a broken leg, and the last by severe sickness; therefore,

Resolved, That we hereby extend to them our sincere sympathy and most earnestly hope that they may be soon restored to their accustomed health and strength, and suffer no permanent disability.

Resolved, That we greatly miss their wise council, their efficient aid, and their ever genial presence, as for many years they have been present at every gathering of the Executive Committee and exercised a leading influence in making our annual Fairs a success. We have come to regard them as a necessary part of the State Agricultural Society, and without their presence, council, and advice, any State Fair or meeting of this committee will necessarily seem incomplete.

(Signed),
W. J. BAXTER.
HENRY FRALICK.
GEO. W. PHILLIPS.
A. J. DEAN.
H. O. HANFORD.

The report was adopted unanimously.

A number of late entries were reported.

It was moved and supported, that the rule governing such entries be strictly adhered to. Carried.

Supt. Butterfield stated that a bull had been entered in his department in the name of a firm, also in the name of a member of the firm.

Mr Butterfield understood that the rules would prevent an individual member of a firm from entering an animal belong to such firm, in his own name, and moved that the rules be so construed.

The motion prevailed.

A motion to reconsider was then carried, and a lengthy discussion had on the question.

Mr. Butterfield's motion was again carried.

Mr. O'Niel, of Kalamazoo, asked that supply wagons be admitted to the grounds free. On motion, tabled.

Adjourned.

E. O HUMPHREY, *President.*

J. C. STERLING, *Secretary.*

BURDICK HOUSE, KALAMAZOO,
Tuesday, Sept. 15, 1885.

The Executive Committee met at 8 o'clock P. M.

President Humphrey presiding.

Present—President Humphrey, Treasurer Dean, Messrs. Ball, Sharp, Hyde, Rising, Butterfield, Lessiter, J. P. Shoemaker, Gard, Angel, Howard, Hanford, Reed, Wood, Burrington, Anderson, Gilbert, Young, Baxter, Phillip, Parsons, Fralick and Secretary.

President Humphrey stated that it had been reported to him that the family occupying the club house on the fair grounds were selling liquor.

Mr. Gilbert moved that the matter be referred to a committee, to consist of the President, Messrs. Baxter and Fralick. Carried.

The Michigan Hedge Co., of Adrian, presented a petition, asking that a committee be appointed to examine into their system of hedge growing, and that a medal be awarded them.

Referred to the Committee on Rules.

Committee adjourned.

E. O. HUMPHREY, *President.*

J. C. STERLING, *Secretary.*

MEETING OF THE SOCIETY.

Tuesday Eve., Sept. 15, 1885.

Pursuant to published notices, the caucus of the Society was held at the Burdick House.

Mr. Humphrey was, on motion, chosen Chairman, and J. C. Sterling, Secretary.

On motion of Mr. Sharp, a recess of ten minutes was taken.

At the expiration of the time named, Chairman Humphrey called the meeting to order.

Mr. Fralick moved that a committee on nominations be appointed, consisting of one from each Congressional District, or as nearly so as practicable.

The motion prevailed, and Messrs. Henry Gale, W. J. Baxter, A. O. Hyde, Henry Fralick, James M. Turner, Amos Root, E. W. Rising, C. W. Young, D. W. Howard, Chas. Moore and J. P. Shoemaker were named as such committee.

Messrs. Young and Howard asked to be excused from serving on the committee.

Upon motion, they were excused, and the balance of the committee requested to do the work.

The committee retired to room 69, and subsequently reported the following nominations:

For President—Wm. Chamberlain, Three Oaks.
For Treasurer—A. J. Dean, Adrian.
For Secretary—Jos. C. Sterling, Monroe.

For Executive Committee—Abel Angel, Bradly; D. W. Howard, Pentwater; H. O. Hanford, Plymouth; F. L. Reed, Olivet; A. F. Wood, Mason; Franklin Wells, Constantine; J. Q. A. Burrington, Tuscola; M. P. Anderson, Midland; John Gilbert, Ypsilanti; C. W. Young, Paw Paw.

Mr. Gilbert asked that his name be withdrawn.

Moved and supported that the report be accepted and adopted. Carried.

Mr. Hanford requested that his name be taken off, and that the name of Mr. Pattengale be substituted; he asked that the vote adopting the report be reconsidered.

Mr. Hanford was requested to remain on the ticket.

On motion, adjourned.

E. O. HUMPHREY, *President.*

J. C. STERLING, *Secretary.*

BURDICK HOUSE, KALAMAZOO,
Wednesday, Sept. 16, 1885.

Executive Committee met at 8 o'clock P. M.

President Humphrey in the chair.

Roll called. Quorum present.

The committee to whom was referred the matter of liquor selling on the grounds reported that they had called upon the parties living in the club house and stationed a policeman at each outside door (four in all) with instructions.

Report accepted and committee continued.

Supt. Burrington, of Division E, poultry, reported regular premiums awarded, amounting to $178 and $10 recommended on non-enumerated birds. Total, $188.

Report, with recommendations, adopted.

Miss Brow, superintendent Divisions O and Q, reported regular awards in Division O as $235.50; discretionary premiums recommended, $28; total, $263.50; premiums in Division Q, regular premiums awarded, $16.50; discretionary recommended, $2; total, $18.50.

Report, with recommendations, adopted.

Supt. Wood, Division F, farm and garden products, reported regular awards in his department amounting to $519. He stated that Mr. Marx, of Detroit, had made two entries for display of vegetables and asked if a first and second premium could be awarded on these entries.

Supt. Wood recommended that a special premium of $50 be awarded the Midland County Fair Association for the display in his department.

It was moved and supported that the special premium recommended by Supt. Wood be awarded. Lost by a vote of 10 to 6.

It was then moved and supported to award the Midland County Fair Association a special premium of $25. After some discussion the motion was laid on the table.

Treasurer Dean reported gate receipts for Monday as $1,608.25; for Monday, Tuesday and Wednesday, $6,454.50.

Supt. Butterfield stated that Mr. Anderson, of Anderson, Ohio, had on exhibition in his department a two-year-old heifer that had been ruled out of competition for not having borne a calf. Mr. Anderson stated that the heifer

aborted at six months, and he thought she was a breeder. A lengthy discussion was had and was participated in by Messrs. Wood, Phillips and Sharp.

Mr. Wood moved that the decision of the superintendent in ruling the heifer out be sustained. Carried.

Mr. Parsons presented an invitation from Senator Stewart asking the committee to call upon him.

The invitation was on motion accepted and 9 o'clock this evening named as the time for making the visit.

The committee then adjourned.

E. O. HUMPHREY, *President.*

J. C. STERLING, *Secretary.*

BURDICK HOUSE, KALAMAZOO,
Thursday, Sept. 17, 1885.

Committee met at 8 o'clock, P. M., President Humphrey in the chair. Quorum present.

Treasurer Dean reported gate receipts for Monday, $1,608.25; Tuesday, $612.50; Wednesday, $4,233.75; Thursday, $7,106.50. Total for four days, $13,561.00.

It was moved and supported to take up the question of awarding a special premium of $25.00 to the Midland County Fair Association. The motion prevailed and the amount was awarded.

Superintendents of Division L, manufactured goods, reported regular premiums awarded, $129.00. Discretionary premiums recommended, $13.00; total, $142.00.

Report with recommendations adopted.

The report of Supt. Shoemaker of Division G, dairy articles, was read, showing regular premiums awarded to be $161.00. Discretionary premiums recommended $3.00. Report accepted. Discretionary premiums not awarded.

Supt. Lessiter of Division D, swine, reported regular premiums in his department amounting to $460.00, and recommended a discretionary premium of $20.00 on Victoria swine.

It was moved and supported to defer action on the report until to-morrow evening. Carried.

The report of the judges of election was read as follows:

We, the undersigned, judges of election for officers of the "Michigan State Agricultural Society," do hereby certify that the whole number of votes cast was sixty-eight.

That Wm. Chamberlain, for President, received	68	votes.
" A. J. Dean, for Treasurer, received	68	"
" Jos. C. Sterling, for Secretary, received	68	"

And for members of the Executive Committee

Abel Angel received	68	votes.
D. W. Howard received	68	"
H. O. Hanford received	68	"
F. L. Reed received	68	"
A. F. Wood received	68	"
Franklin Wells received	68	"
J. Q. A. Burrington received	68	"
M. P. Anderson received	68	"
John Gilbert received	68	"
C. W. Young received	68	"

And were by us declared to have been duly elected to the offices as above named, according to the law regulating the election of officers of said society.

(Signed) E. O. HUMPHREY, *President*,
FRANK LITTLE,
W. B. BLAKE,
S. E. GRAVES,
Inspectors of Election.

Report accepted and ordered filed.

Supt. Howard, of Division C, sheep, reported regular premiums amounting to $1,499.00. No discretionary premium.

Report accepted and adopted.

Adjourned.

E. O. HUMPHREY, *President.*

J. C. STERLING, *Secretary.*

BURDICK HOUSE, KALAMAZOO,
Friday, Sept. 18, 1885.

Committee met at 8 o'clock, P. M. President Humphrey in the chair. Quorum present.

Supt. Baxter, of the Art Department, reported regular premiums awarded amounting to $384; discretionary premiums recommended, $44; total, $428.

Accepted and adopted.

Supt. Shoemaker explained the discretionary premiums amounting to $3 recommended in his department, and asked that they be awarded.

On motion, the recommendations of the Superintendent were adopted, and the premiums awarded.

Treasurer Dean reported the gate receipts for Friday as $1,478.15; total for the week, $15,039.15.

Mr. Cobb reported total receipts for booth rent, $1,606.16.

Secretary reported received for catalogues sold $22.20; for stall rent, $350 paid and about $50 to be collected.

Supt. Butterfield, of Division A, cattle, reported regular premiums awarded in this department as $3,559; discretionary premiums recommended on Guernsey cattle, $20.

Report, with recommendations of Superintendent, adopted.

Supt. Phillips, of Division B, horses, reported premiums awarded amounting to $2,802, all regular.

Report accepted and adopted.

Supt. Sharp, of Division P, miscellaneous, reported regular awards amounting to $15, and recommended discretionary premiums amounting to $5.

Report accepted and adopted.

Supt. Gard, of Division H, bees, honey, etc., reported regular premiums awarded in his department as $279; no discretionary premiums.

Report accepted and adopted.

Mr. David Woodman asked that a premium be awarded him for display of grain in heads, with stool and roots.

On motion, a special premium of $10 was awarded Mr. Woodman.

The report of Supt. Lessiter was taken up, and upon motion, that part of the report recommending a special premium on Victoria swine was tabled; balance of the report adopted.

The committee then voted a recess until 10 o'clock Saturday morning.

SATURDAY MORNING.

Committee met at 10 o'clock A. M., according to recess taken.

The following communication was read and ordered filed:

To the Honorable the President of the Michigan State Agricultural Society:

SIR:—I have the honor to report that, under the arrangement made by your Society for the admission of Crop Correspondents to the Fair just held; there have reported here at my office and been furnished with admission tickets, 145 crop correspondents, and I desire hereby on their behalf, to acknowledge the courtesy, and assure you of its sincere appreciation by the recipients, and at the same time express the hope that your Society have not been the losers by this very generous action.

(Signed), HARRY A. CONANT,
Secretary of State.

On motion of Mr. Hyde, it was

Resolved, That the thanks of this Society are due and are hereby extended to the press of the city of Kalamazoo, and to Proprietor Badger of the Burdick House.

Upon motion, Chairman Cobb of the Business Committee, was authorized to take charge of the property of the Society on the Fair grounds, and to sell such articles and lumber as he thinks best.

Committee adjourned.

E. O. HUMPHREY, *President.*

J. C. STERLING, *Secretary.*

PROCEEDINGS OF THE EXECUTIVE COMMITTEE AT THE *ANNUAL WINTER MEETING.*

FIRST DAY.

RUSSELL HOUSE,
DETROIT, January 11, 1886.

The regular annual meeting of the Executive Committee was called to order at 8 P. M., President Humphrey in the chair.

The roll was called and the following members answered to their names:

President Humphrey, Messrs. Hanford, Ball, Lessiter, Cobb, Sharp, Hyde, Reed, Gard, Burrington, Chamberlain, Angel, Howard, Young, Butterfield, Gilbert, Anderson, Smith, Baxter, Phillips, Fralick, Parsons, and the Secretary.

President Humphrey read his address and invited President-elect Chamlain to the Chair.

ADDRESS OF PRESIDENT HUMPHREY.

Gentlemen of the Executive Committee and Members of the State Agricultural Society:

It affords me pleasure to be able to greet you at this Thirty-Seventh Annual Meeting of this Society under such favorable circumstances.

Our whole country has been blessed with general health, peace and plenty.

Our own State has been especially favored with a bountiful harvest, and all its industries have been prospered.

Notwithstanding this general prosperity, it has been a fatal year with the prominent

and distinguished men of our land. There has seemingly a greater number of this class of men died than in any former year of this generation, and still the world moves on as though nothing unusual had happened. There is somebody in reserve to fill every vacated place, and keep the great machine running as perfectly as before. This shows the discipline of the people and the world's progress.

This Society, I believe, has made some progress in its management. We seem to be gradually shaking off some of the obnoxious features which have been hitched on to the Society for years past.

I am clearly of the opinion that the best policy for the Society is to rid itself of all outside shows of every description and nature, encouraging that only which truly belongs to an Agricultural and Mechanical Society. Other States which have adopted this policy are well pleased with the result.

They find they are rid of the nuisance which interrupts the true object of the Fair, and besides this, the receipts have been increased, which shows that the people will sustain a genuine Agricultural Fair. California has tried this experiment for the past two years with the most gratifying results.

I am still of the same opinion, as I signified to the committee a year ago, that the draft on the Society for premiums and other contingent expenditure is too large to be met with the receipts from the Fair, except under the most favorable circumstances.

The Society cannot reasonably expect but that it will occasionally be caught with a rainy week, or some other outside influence as a drawback against large receipts.

We were favored with beautiful weather during the week of our last Fair, but there were other influences that prevented a large attendance.

The attraction at Grand Rapids the same week, and the necessity which compelled farmers to attend to their wheat seeding that week, being unable to do it the week previous on account of the incessant rains.

This undoubtedly kept thousands away from the Fair. The result was, which is much to be regretted—that the receipts were not sufficient to pay the demands against the Society, and we may expect like causes to produce like results in the future.

I believe it would be wisdom on the part of the Executive Committee to strike from the Premium List the third and fourth premiums.

The third and fourth premiums are very little credit to the exhibitor; in fact I believe that most people would rather have no premium at all. And it is plain to my mind that it is not good policy for the Society to encourage the exhibition of third and fourth rate animals and be compelled to meet the cost necessary to sustain it.

In the effort made to enforce the rule to prevent the sale of spirituous liquors on the Fair Ground we were obliged to contend with stubborn resistance from an occupant in the rear part of the President's office building, which had been, by our contract, reserved for the use of family living rooms. It became evident after the opening of the Fair that they were selling liquor. They were ordered to stop the traffic, but they declared their right to sell under their contract, and persisted in doing so. Their having possession of the premises, there seemed to be no legal way to remove them before the end of the Fair, and our only recourse seemed to be to place a guard on the outside of the building to prevent customers from entering. Even then we failed to some extent in preventing the traffic. The mistake was to begin with, in allowing any reservation of a foot of ground, for any purpose whatever, within the enclosure of the Fair ground.

Aside from this affair, there was no liquor selling to my knowledge.

Nearly all the departments of the Fair were well filled with exhibits of the rarest production, and showed to the best advantage under the faithful guidance and care of experienced Superintendents.

The absence of Mr. Sterling and Mr. Smith, on account of injury and sickness, was much regretted. These gentlemen having been so closely identified with the Society for so many years, it made a great vacuum in the the ranks of the Superintendents. It is to be hoped they may be speedily restored to their former health and vigor, and be present with us at our next annual Fair.

The criticisms on the conduct and management of this Society, which appeared in the columns of the *Michigan Farmer*, are, I think, a little extraordinary. There can be no objection to criticisms, if made intelligently and with a right spirit.

It asserted that the Society is doing too much to advance the interest of the Ohio and Indiana fairs, in place of bestowing all our energies in the interest of our own State. That the elections are not conducted as they should be. That the ex-Presidents should be dropped out, or not be made life members of the board. That the officers are inclined to perpetuate themselves in office by seeing to it that they are re-elected from year to year.

This reminds me of the way they used to do things down in Connecticut a good many years ago. In the Township of Farmington there resided a gentleman by the name of

Timothy Pitkin, who had been elected to the House of Representatives of the General Assembly thirty-five times, and went by the distinguished title of Squire Pitkin. At the annual meeting of the Freemen at that time, it was the constitutional law and practice not to vote for the State officers and representatives at the same time, as at present, but the Freemen first elected the representatives one at a time, and so accustomed had the people become to electing this gentleman to the House of Representatives, that as soon as the meeting was opened, and I suppose with prayer by the minister, as was the custom in those days, the moderator, instead of calling on the people to bring forward their ballots for a representative, would say, bring forward your votes for Squire Pitkin. And it should be added for the credit of the good people, that they always obeyed this order of the moderator. So you see we cannot have the credit of inventing this kind of sharp practice of which we are accused.

Now, I cannot believe that any candid man, who has been at all familiar with the motives and management of this Society, would undertake to vindicate any such declaration as is set forth in those articles. Whatever arrangements and agreements have been entered into with our neighboring States, have been done purely for the purpose of protecting ourselves.

Some seven or eight years ago those States were holding their Fairs the same week we were holding ours, and it became evident that it was greatly to our disadvantage. To overcome this difficulty, we submitted to those States the propriety of holding their Fairs on other weeks, we claiming the third week in September as our week, it having been adopted by our Society for a number of years previous to that time; to which they consented ; and it was then thought we could benefit one another by an interchange in advertising, which would be a mutual benefit to all with little expense to either ; and thus far I have not been able to discover any bad results from this arrangement.

Find fault with our elections ! This is too absurd to be entertained for a moment.

I don't suppose the greatest genius on the face of the earth could invent a plan that would be fairer, or work more equal justice to all interested parties, than that which has been pursued by the Society for the past number of years. The Society has a general rule, which has been carried out with exact precision, requiring the appointment on the first day of the Fair, of three persons, who are members of the Society, to act as judges of election, and requiring at the same time the selection of the place on the Fair ground where the election shall be held. Notice of the names of the judges, together with the place where the polls will be held, shall be given on the second day of the Fair, by publication and posting of notices on the Fair ground, in at least twenty places, the election to be held on the third day of the Fair. Members only can vote, on presentation of membership tickets. The vote to be received by the judges and deposited in a sealed box, the ticket first having been stamped and name of voter registered. Every member is free to vote for whom he pleases, and with a secret ballot. The counting of votes is governed by the rule prescribed by law for the government of township elections. The poll is open from nine A. M. until five P. M.

In conducting the caucuses, it has been customary for years to make a committee, comprising a member of the Society (not officers) from each Congressional District, if they are to be found in the convention. They report names for officers, subject to the approval of the convention. In case there are not members present from all the districts, such districts are not represented, only in some cases, by the appointment of an executive member, should there be any present from such district.

Want to get rid of the old members of the Committee and ex-Presidents!

I regard this proposition a little remarkable in face of all the facts.

These men that have been tried and not found wanting when the Society was passing through its most critical ordeals—for it has been subjected to every test that ever overtook a like institution. Men of age and experience, of unquestioned ability and business capacity. Men of lasting fidelity to the Society.

The trouble is, you are getting rid of them too fast. They are dropping out of the ranks at a fearful rate. In looking over the list I find that fourteen out of the twenty-three executive members and officers have disappeared within seven years, and there are not more than four or five ex-Presidents remaining who give any attention to the business of the Society, the others having died, become disabled or prevented by other causes. In the progressive development of humanity in all countries, and throughout all ages, so far as our knowledge goes, the cultivated races of the world have been accustomed to pay respect and honor to age and experience. In fact to some extent this is a gauge by which the progress of different people in civilization and refinement can be measured. Such conduct is commendable as a recognition of the valued services of these men ; and more, the Society cannot afford to lose them. If this institution is not to perish with all the good there is in it, it must be saved by the wisdom and intelligence of just such men as these.

The Horticultural display at the Fair was a marvel of beauty and excellence, which

reflects great credit on the officers and managers of that Society, and it is to be hoped their good work will go on.

Our annual visit to the Agricultural college in June was a very interesting event. It strengthened my conviction more firmly than ever of its importance and usefulness in promoting the interests of agriculture in our State. Its well arranged appointments speak well for the management of the institution. The systematic arrangements throughout the college buildings and farm, the superb judgment and taste exhibited in the selection and breeding of stock and the well cultivated fields, is a worthy example for any of the most exalted taste and ambition, and the young men who have the opportunity and benefit of that institution are highly favored.

To the Press and Railroads of the State, and the Mayor and Council of the City of Kalamazoo, for your courtesy and assistance in perfecting and carrying out the arrangements for the Fair, I tender you the sincere thanks of the Society.

Before retiring from the Presidency of this Society, I wish to tender to this committee my grateful acknowledgments for your kindness and assistance in the discharge of my official duties, for which please accept my most cordial thanks.

Gentlemen of the committee, I now have the pleasure of presenting to you and to this chair the Hon. Wm. Chamberlain, your President.

President Wm. Chamberlain then delivered his inaugural address as follows:

ADDRESS OF PRESIDENT CHAMBERLAIN.

Gentlemen of the Executive Committee of the State Agricultural Society:

To you have been intrusted the interests of this Society for the ensuing year, and upon the result of your conclusions at this meeting depend largely its future usefulness and its future success in the State.

This Society has been fortunate in having for its officers men of practical experience in the various vocations of life, who were willing to give a share of their time without compensation for its success.

During the Society's history it has been carried through some severe financial difficulties without aid from the State, except in the first few years of its existence, and depending upon the liberality of its patrons, has succeeded in attaining to a position equaling that of any State organization of the kind in the country; and is a prominent and positive factor in the development of agriculture and its kindred arts throughout the State.

Since its organization thirty-seven years ago, the Society has held annual Fairs, paying out liberal sums of money in premiums each year, stimulating a healthy spirit of competition among exhibitors, giving them every facility possible to make a display of their products, and affording visitors a fine opportunity for viewing a great variety of interesting exhibits from other States as well as our own.

It is generally conceded that this Society is one of the most liberal to exhibitors of any in the country, and I trust it may continue to be so as far as practicable.

The Fair at Kalamazoo last year, as an industrial exhibition, was a success and all that could be desired on the part of the Society.

Financially it was not up to our expectations, for the expenditures exceeded the receipts.

Some criticisms have been made respecting certain classes of exhibitions allowed upon the Society's grounds, and the question was asked last year, "What propriety was there in allowing the Buffalo Bill company to make a display on the grounds the first day of the Fair?"

My answer would be that there is a legitimate place upon the Fair grounds for everything instructive, entertaining or amusing that is not demoralizing in its tendency.

This exhibition afforded an opportunity to compare the wild cattle and horses of the plains with the improved breeds of the States, and afforded amusement for those who desired to witness great skill in the use of fire-arms, and the riding of untamed animals.

We cannot expect that all visitors at our Fair will be interested in the same class of exhibits; and therefore we should endeavor to give as large a variety of amusements as is wise and consistent, keeping in view at all times the object for which the Society is organized.

The rules governing in every department of our Fair should be carefully considered at this meeting, and such changes be made as seem proper and necessary.

One of the rules of the Society requires the Superintendents of the several departments to be on the grounds Thursday preceding the Fair, to assign space to exhibitors. To comply with this rule, Superintendents are often put to considerable inconvenience in spending so much time on the week before the Fair, and the result is that often they

do not come until Saturday, or even until Monday, much to the annoyance of exhibitors desiring space on these days. I would recommend that the assigning of space in divisions F, G, H, J, K, L, M, N, O, P, Q be under one Superintendent, who shall make a diagram of all the space in these departments, and assign to all persons applying up to the first day of the Fair, keeping a book, in which is recorded the name of the exhibitor with the name of exhibit, and turn over these departments to the Superintendent of the division on the first day of the Fair. I am decidedly of the opinion this change would be a saving to the Society, and more satisfactory to exhibitors.

No one can better judge of the objects or merits of a rule than the Superintendents and heads of the departments.

The Fairs have reached such a magnitude that it has been found that any radical change affecting the rules after the exhibition is opened, is attended with serious difficulties and should, if possible, be avoided.

The expense incurred in holding our Fairs seems very large, and under our present system must necessarily continue to be so.

It should be remembered that we have no State treasury to fall back upon to meet the deficiency, which is likely to occur soon, unless we devise some plan by which our receipts shall equal our expenditures.

Most State societies are receiving aid from the State.

Michigan has given this Society a name *only*, and with its name, and with the energy put forth by its managers, it has attained to its present merited position among the leading agricultural organizations of the world.

The people of this State are favored with local agricultural societies, equaling in number one to each organized county, and each holding its annual Fair. Some of these societies have become powerful auxiliaries to this, and very strong competitors for its honors.

It is gratifying that they have been so liberally sustained, and this indicates that our people are not only interested in these enterprises, but that they also appreciate fully their real merit and value.

The question of a permanent location for holding the Fair, has been discussed at former meetings, and I trust it will receive deservedly careful consideration by you, after the report has been received from the special committee appointed last year to consider the subject.

If it should be your decision that the time has come to locate the Fair permanently, I am of the opinion that we should adopt the policy of other States and ask this State to provide for the purchase of the land and the erection of suitable buildings at some central point having good railway facilities.

Should there be objection to the State donating the amount necessary, it might loan the Society the money, to be paid back when its finances would warrant.

If, however, the present plan of holding the Fairs in different parts of the State is to be continued, arrangements should be made with several local societies for the use of grounds and buildings.

I think this may be done at less expense than we have been to in former years, and thus enable us to increase our premiums.

Michigan is credited with having the most efficient Horticultural Society in the country. The present arrangement that this Society has with the Horticultural Society should be continued, and I trust the benefits resulting may be mutual.

The State Agricultural College of Michigan has a national reputation, and through the efficient work of the State Board of Agriculture and its faculty, has become the foremost institution of its kind in this country. The annual visits of this Board have been pleasant, and I believe, profitable to all concerned.

The financial condition of the Society will be reported by the Treasurer.

In conclusion, I will say that I am in full accord with the general policy recommended by Mr. Humphrey, the retiring President; and in assuming the duties of the office to which I am now called, I desire to return to the gentlemen of this Committee and to the members of this Society generally, my sincere thanks for the honor conferred, with the earnest hope that I may be able to serve you satisfactorily, as have my honorable predecessors.

SECRETARY'S REPORT.

To the President and Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN—I would respectfully submit the following report as a statement of the transactions of the Secretary's office for the year 1885:

Two hundred and fifty orders, amounting to $12,842.07, were drawn upon the Treasury for the payment of accounts audited by the Business Committee, signed by the

Secretary and countersigned by the Chairman of the Business Committee. The detail of the general expenditures for which the above orders were issued has been classified and arranged under the proper heads, and will be reported by the Business Committee; a record of the same will be found in the Secretary's register of accounts for 1885, and upon the stubs of the orders. Vouchers corresponding with the orders are on file in the Secretary's office.

Three hundred and fifty-nine checks, amounting to $10,497, were issued for the payment of premiums awarded at the annual Fair. A full and detailed statement, giving number of check, amount, and name and address of party to whom issued, will be found in the accompanying schedule.

The Horticultural exhibit was under the general supervision of the State Horticultural Society, and premium checks for the awards, amounting to $999.75, were drawn on Treasurer Dean by Secretary Garfield, of that Society.

The following table exhibits the amount of cash premiums offered and awarded in each division; also the number of Diplomas and Medals offered and awarded.

CASH PREMIUMS.

Division.	Offered.	Awarded.
A—Cattle	$3,871 00	$3,679 00
B—Horses	3,910 00	2,802 00
C—Sheep	1,568 00	1,499 00
D—Swine	835 00	460 00
E—Poultry	353 00	188 00
F—Farm and Garden Products	732 00	544 00
G—Dairy Articles	219 00	164 00
H—Bees, Honey, etc	302 00	279 00
I—Farm Implements	------	------
J—Vehicles	------	------
K—Machinery	------	------
L—Manufactured Goods	438 00	142 00
M—Musical and Surgical Instruments	23 00	------
N—Art	561 00	428 00
O—Needle and Fancy Work	326 00	263 50
P—Miscellaneous	110 00	20 00
Q—Children's Work	50 50	18 50
	$13,289 50	$10,487 00
Horticultural Department	1,265 50	999 75
Total	$14,564 00	$11,486 75

DIPLOMAS AND MEDALS.

Division.	Diplomas Offr'd.	Diplomas Awarded.	Medals Offr'd.	Medals Awarded.
D—Swine	6	2	--	--
L—Manufactured Goods	1	--	1	--
M—Surgical Instruments, etc	7	--	--	--
N—Art	1	--	--	--
O—Needle and Fancy Work	2	--	--	--
P—Miscellaneous	--	--	2	--
Total	17	2	3	--

The following is a list of entries in each Class and Division:

Division A—Cattle.

Class.	
1—Shorthorns	166
2—Devons—	60
3—Herefords	93
4—Jerseys	126
5—Galloways and Polled Angus	54
6—Holstein-Friesians	119
7—Grade Cattle	32
8—Fat Cattle	65
N. E. Guernseys	3
Total	718

Division B—Horses

Class.		
9—Cleveland Bays	6	
10—Thoroughbreds	12	
11—All Work	55	
12—Roadsters	32	
13—Breeders' Stock	50	
14—Gents' Driving Horses	25	
15—Clydesdale and English Draft Horses	20	
16—Norman, Percheron and other French Draft Horses	19	
17—Draft Horses	7	
18—Carriage and Buggy Horses	23	
19—Michigan Roadster Stallions	16	
20—Michigan Roadster Mares and Geldings	32	
21—Michigan Horses under Saddle	11	
22—Sweepstakes—Stallion, with Get	9	
Total		317

Division C—Sheep.

Class.		
23—Thorough-bred American Merinos	53	
24—Thorough-bred American Merinos bred and owed in Michigan	58	
25—Fine Wool Grades	28	
26—Southdowns	39	
27—All Middle Wools other than Southdowns	53	
28—All Middle Wools other than Southdowns bred and owned in Michigan	60	
29—Leicesters	20	
30—Cotswold and other Long-Wooled Sheep	25	
31—Grade Coarse-Wooled Ewes	32	
32—Fat Sheep	25	
Total		393

Division D—Swine.

Class.		
33—Berkshire	11	
Essex	21	
Suffolk and Small Yorkshire	2	
Poland-China	74	
Chester White and Large Yorkshire	26	
Duroc or Jersey Red	3	
Fat Hogs	6	
N. E. Victorias	8	
Total		151

Division E—Poultry.

Class.		
34—Poultry		249

Division F—Farm and Garden Products.

Class.		
35—Grain and Seeds	70	
36—Roots and Vegetables	184	
37—Display of Roots and Vegetables	3	
38—Flour, Meal and Feed	27	
Total		284

Division G—Dairy Articles.

Class.		
39—Butter, Cheese and Dairy Articles	52	
40—Sugar, Bread and Pickles	46	
41—Soap, Prepared Groceries, etc	2	
Total		100

Division H—Bees, Honey, Etc.

Class.		
42—Bees, Honey, etc		79

Division I—Farm Implements.

Class.		
43—Plows	67	
44—Tillage Implements	62	
45—Seed Drills, Sowers, Planters etc	16	
46—Haying and Harvesting Machinery	75	
47—Apparatus for Cleaning and Preparing Crops	20	
48—Miscellaneous Farm Articles	33	
Total		273

Division J—Vehicles.

Class.		
49—Vehicles		209

Division K—Machinery

Class.		
50—Machinery for Working upon Metals	3	
51—Miscellaneous Machinery	12	
Total		15

Division L—Manufactured Goods.

Class.		
52—Materials	15	
53—Factory-made Goods	4	
54—Articles of Dress	4	
55—Articles of Leather and India Rubber	83	
56—Furniture	14	
57—Stoves, Iron and Concrete Work	29	
Total		149

Division M—Musical and Surgical Instruments, Etc.

Class.		
58—Musical Instruments and Sewing Machines	45	
59—Surgical and other Instruments		
60—Clocks, Jewelry, etc		
Total		45

Division N—Art.

Class.		
61—Painting and Sculpture	283	
62—Printing and Stationery	4	
Total		287

Division O—Needle and Fancy Work.

Class.		
63—Articles of Ladies' Dress	33	
64—Plain Needle and Machine Work	69	
65—Embroidery and Ornamental Needle Work	218	
66—Crochet, Knit and Fancy Work	112	
67—Hair, Shell and Wax Work	11	
Total	443	

Division P—Miscellaneous.

Class.		
68—Miscellaneous Articles	25	
69—Household Articles	19	
Total		44

Division Q—Children's Department.

Children's Work	30

Horticultural Department.

Fruit, Flowers, etc	1,002
Total entries in all departments	4,788

The following moneys coming into my hands as Secretary of the Society through the sources named, have been paid over to the Treasurer and his receipt taken for the same:

From Annual Memberships	$611 00
" Life Memberships	10 00
" Stall rents	396 30
" Catalogues sold	22 20
Total	$1,039 50

During the year the following named societies have filed "Articles of Association" in this office:

"New Monroe County Agricultural Society."
"Crosswell Agricultural Society."
"Emmet District Agricultural Society."
"Imlay City Agricultural and Horticultural Society."

Inventory of Property in the Secretary's Office.

American Shorthorn Herd Book	28 vols.
American Jersey Cattle Club Herd Register	16 vols.
American Devon Herd Book	5 vols.
Dutch Friesian Herd Book	3 vols.
Holstein Herd Book	8 vols.
North American Galloway Herd Book	1 vol.
Pedigrees of English Shorthorn Bulls	1 vol.
American Stud Book	3 vols.
American Berkshire Record	4 vols.
Vermont Merino Sheep Register	1 vol.
Michigan Farmer for years 1845 to 1854	8 vols.

Agricultural reports of Michigan, Ohio, Indiana, Illinois, Iowa, Kansas, Missouri, Massachusetts, Connecticut, New Hampshire, Maine, California, Upper Canada, Department of Agriculture, and the Michigan State Horticultural Society.

1 Office desk.	1 Society seal.	1 Gold medal.
6 Inkstands.	2 Bill files.	2 Letter files.
1 Postal scale.	1 Pair shears.	15 Spindles.
	5 Boxes for books.	

J. C. STERLING, *Secretary.*

Accepted, and referred to the Committee on Finance.

W. H. Cobb, Chairman of the Business Committee, presented the following report, which was accepted and referred to the Committee on Finance:

STATEMENT OF BUSINESS COMMITTEE IN DETAIL.

WINTER MEETING.

1885.	No. Order.		
Jan. 16.	3	Henry Fralick, expenses	$4 75
	4	D. W. Howard, "	16 80
	5	F. L. Reed, "	8 10
	6	W. H. Cobb, "	9 05
	7	E. O. Humphrey, "	4 55
	8	J. C. Sharp, "	2 30
	9	M. P. Anderson, "	4 55
	10	A. F. Wood, "	4 25
	11	H. O. Hanford, "	3 65
	12	G. W. Phillips, "	5 60
	13	M. J. Gard, "	7 55
	14	W. Chamberlain, "	8 85
	15	E. W. Rising, "	5 50
	16	A. J. Dean, "	4 80
	17	A. O. Hyde, "	4 00
	18	John Lessiter, "	2 00
	19	J. M. Sterling, "	1 50
	20	Wm. Ball, "	2 70
	21	G. H. Butterfield, "	3 50
	22	John Gilbert, "	3 50
	23	J. P. Shoemaker, "	5 10
	24	Abel Angel, "	7 45
	25	C. M Green, "	3 00
	27	Russell House, Board Committee	261 00
Mar. 24.	29	J. C. Sterling, expenses	3 50
	31	U. S. Express Co., express on books and traps to meeting	3 05
June 29.	56	*Detroit Free Press, 300 copies of Proceedings of Winter Meeting*	123 75
Oct. 9.	149	C. W. Young, expenses attending meeting	10 60
			$524 95

Switching.

Sept. 28.	65	G. R. & Ind. R. R. 34 cars at $2.00	$68 00

LANSING MEETING.

June 10.	35	Hudson House, Board Committee	$44 75
	36	G. W. Phillips, expenses	9 75
	37	A. F. Wood, "	60
	38	W. H. Cobb, "	6 20
	39	J. C. Sharp, "	2 20
	40	M. J. Gard, "	5 60
	41	W. Chamberlain, "	9 10
	42	O. W. Howard, "	7 50
	43	John Gilbert, "	5 75
	44	J. P. Shoemaker, "	3 25
	45	H. O. Hanford, "	5 30
	46	Abel Angel, "	5 00
	47	A. O. Hyde "	5 60
	48	M. P. Anderson, "	4 40
	49	E. W. Rising, "	3 50
	50	Wm. Ball, "	4 25
	51	E. O. Humphrey, "	5 00
	52	U. S. Express Co., charges on packages	10 00
	55	John Lessiter, expenses	5 55
	61	Philo Parsons "	3 96
Dec. 16.	218	J. C. Sterling, "	6 85
			$154 11

Implement Department.

1885.	No. Order.		
Jan 16.	2	Abel Angel, expenses for 1884	$5 05
Oct. 9.	106	Abel Angel, Supt. expenses	12 86
	111	H. O. Hanford, Supt. expenses	42 90
	148	C. W. Young, Supt. expenses	16 50
			$78 20

Herd Book.

July 23.	60	A. S. H. B. Ass'n, Chicago, Ill., for vols. 25, 26, 27 and 28 S. H. H. B	$20 80
Mar. 24.	28	New Jersey Cattle Club, New York, 7th vol	21 10
			$41 90

Secretary's Office.

Jan. 16.	1	J. C. Sterling, 3 months' salary	$2[illegible]0 00
Mar. 24.	34	J. C. Sterling, 3 months' salary	25[illegible] 00
June 29.	57	J. C. Sterling, 3 months' salary	[illegible]
Oct. 5.	73	Geo. E. Smith, clerk for Secretary	[illegible] 00
	74	A. W. Cummings, clerk for Secretary	14 50
	76	Albert Little, clerk for Secretary	23 00
	75	S. H. Ives, clerk for Secretary	15 00
	77	Mrs. M. Eddy, board of clerks	60 25
	78	Burdick House, board of Secretary and clerks	69 00
	79	Mrs. Tompkinson, board of clerks	20 00
8.	81	C. J. Phillips, clerk for Secretary	35 50
	82	W. B. Blake, clerk for Secretary	12 50
	83	W. K. West, clerk for Secretary	16 70
	84	W. H. Horton, clerk for Secretary	27 60
	85	J. E. Landon, Asst. Secy	37 50
13.	181	J. C. Sterling, 3 months' salary	250 00
Dec. 16.	240	J. M. Sterling, rent of office	$50 00
			$1,426 55

Postage.

Mar. 24.	32	Postmaster at Detroit, stamps for Secretary	$ 5 00
June 10.	53	Postmaster at Detroit, 500 cards	5 00
	54	Postmaster at Detroit, stamps for Secretary's office	10 00
July 23.	58	Postmaster at Detroit, stamps for premium list	12 00
Sept. 28.	68	Postmaster at Kalamazoo, stamps for posters	16 00
	69	Postmaster at Detroit, stamps for complimentaries	16 00
	70	Postmaster at Kalamazoo, stamps, for Secretary	5 00
Oct. 9.	176	Postmaster at Kalamazoo, stamps Business Com	5 00
22.	204	Postmaster at Adrian, stamps for printing, etc	5 00
Dec. 16.	225	Postmaster at Detroit, stamps for Secretary's office	5 00
	227	W. C. Stearns, Adrian, stamps for Treasurer	11 20
			$95 20

Locating Committee.

Mar. 24.	33	Expenses of Hyde and Sterling, hotel bill, Kalamazoo	$27 30

Printing and Advertising.

Jan. 16.	26	G. M. Leonard, Grand Rapids, posting bills	$1 00
July 23.	59	James W. Fleming, Columbus, Ohio, circuit posters	4 75
Mar. 24.	30	F. D. Hamilton, Monroe, letter and bill heads	15 25
July 23.	62	Burdick House, Kalamazoo, board committee	2 50
	63	C. W. Young, expenses at Kalamazoo	2 85
	64	F. D. Hamilton, Monroe, 5,000 premium lists, 4,000 entry blanks and letter heads	232 30
Sept. 28.	66	Democrat Printing Co., Monroe, cards, etc	65 25
Oct. 5.	80	W. K. West, Monroe, folding and making posters	22 50
13.	92	A. J. Shakespeare, Kalamazoo, publishing notices	6 75
22.	197	Times and Expositer, Adrian, letter heads, etc	115 80
	198	Calvert Lithograph Co., Detroit, Lithographs and comp	104 68
	215	G. F. Payne, Adrian, Entry and Committee books	63 30
	211	O. S. Gully, Bornam & Co., Detroit, tickets	74 30

1886.		No. Order.		
Dec.	8.	215	Detroit Free Press Co., 600 2-sheet bills	$45 00
		216	Johnson & Gibbons, Detroit, publishing awards in Farmer	75 00
	16.	219	J. C. Sterling, Monroe, Sundry trips to Kalamazoo	27 00
		221	M. D. Hamilton & Son, Monroe, envelopes, letter heads, etc.	18 10
		222	A. J. Shakespeare, Kalamazoo, printing tags	2 65
		228	Kalamazoo Pub. Co., Kal., printing posters, catalogues, etc.	307 77
		232	A. J. Dean, Adrian, expenses of chairman of committee	28 60
				$1,214 85

Forage.

Oct.	13.	80	H. Beckwith, Kalamazoo, hay and straw	$359 85
	9.	125	E. W. Rising, board of Supt.	17 50
		126	E. W. Rising, expenses of Supt.	30 47
		127	Chas. Young, Kalamazoo, hay	93 30
		128	J. N. Kendall, Kalamazoo, straw	91 39
		129	R. C. Balch, Kalamazoo, hay and straw	210 28
		130	S. B Hammond, Kalamazoo, hay	75 91
		131	J. Parsons, Kalamazoo, hay	125 20
		132	E. W. Rising, labor and hay	108 00
				$1,111 90

Stationery.

Sept.	28.	67	F. W. Muir, Monroe, cards, etc.	$16 97
		72	G. W. Young, Kalamazoo, sundries	2 89
				$19 86

Building.

Oct.	9.	87	Pay-roll, Kalamazoo labor pay roll	$314 00
		88	Pay-roll, Kalamazoo labor pay-roll	108 50
		89	John Hastings, freight and charges on tents, etc.	21 53
		161	Lakey & Bigelow, Kalamazoo, roofing building	26 82
		168	Pay-roll, Kalamazoo, labor pay-roll	263 48
		169	Pay-roll, Kalamazoo labor pay-roll	184 10
		177	Pay-roll, Kalamazoo labor pay-roll	180 50
		179	Bush & Paterson, moving implement building	150 01
	13.	182	Pay-roll, labor pay-roll	54 08
		191	R. W. Southworth, paint, oil, labor, etc.	16 51
		189	R. Smith, Jr., Kalamazoo, glass, putty, paper, etc.	28 01
				$1,353 43

General Expenses.

Oct.	9.	90	Kalamazoo Wagon Co., sundry repairs	$14 00
		97	D. C. Reed, Kalamazoo for use of ground at station	5 00
	13.	102	C. M. Cobb, carrying mail	15 00
		104	W. H. Cobb, Kalamazoo, sundry expenses	8 70
		103	F. W. Jackson, Kalamazoo, 10 loads saw dust	15 00
		156	S. E. Graves, Adrian, Inspector of election	3 00
		157	Frank Little, Kalamazoo, inspecter of election	3 00
		166	Pay-roll, Kalamazoo, help during the fair	29 00
Oct.	18.	171	James Stern, Kalamazoo, lighting lamps	8 00
		187	J. B. Cobb, stationery, etc.	2 38
	31.	214	Riverside Truck Co., Detroit, part of license	20 00
Dec.	16.	223	Seib & Baier, Monroe, tacks, twine, etc.	3 73
		224	Zabriskie & Bennett, Detroit, press for seal	3 40
		231	A. J. Dean, Adrian, expenses to Detroit and Monroe	20 19
		234	J. C. Sterling, Monroe, expenses during Fair	35 43
		235	A. J. Dean, Adrian, stall rent	8 00
		241	Thos. Buckley & Co., Kalamazoo, machinery work	3 60
				$197 43

Transportation.

Sept.	28.	71	Joel Waterbury, Kalamazoo, livery	$7 50
Oct.	9.	133	J. M. Sterling, Monroe, expenses of chairman	9 25
				$16 75

Meal Tickets.

1885.	No. Order.		
Oct. 13.	91	Wm. H. Cobb, Kalamazoo, 574 tickets	$191 33
	174	Wm. H. Cobb, Kalamazoo, 22 tickets	7 33
Dec. 16.	238	Wm. H. Cobb, Kalamazoo, tickets	13 66
			$212 32

Power.

Oct. 13.	93	Wm. B. Bennett, engine for line shaft	$30 00
	160	Austin Potts, Galesburgh, engine, main shaft	30 00
	193	McCormick Harvester Co., power machinery hall	125 00
			$185 00

Marshal's Department.

Oct. 13.	94	Struthers & Merrell, Kalamazoo, oats	$0 70
	150	D. B. Merrell & Co., Kalamazoo, oats	2 65
	153	A. O. Hyde, Marshal, expenses of assistant and horses	156 75
			$160 10

Telegraphing.

Oct. 13.	95	G. R. & I. Tel. Co., Kalamazoo, 1 dispatch	$0 25
	105	W. U. Tel. Co., Kalamazoo, sundry messages	7 25
Dec. 16.	223	W. U. Tel. Co., Kalamazoo, sundry messages	7 10
			$14 60

President's Lunch Room.

Oct. 13.	96	W. C. Davis, Kalamazoo, coffee, etc	$9 00
	100	S. Brown, Kalamazoo, labor	19 50
	101	Mrs. Clay, Kalamazoo, labor, washing	4 00
	164	Mrs. Cobb, Kalamazoo, 30 lbs. butter, at 20 cents	6 00
	165	S. Brown, Kalamazoo, help	55 00
	185	Cobb & Hunter, Kalamazoo, dishes, etc	9 40
	240	G. D. Taylor, Kalamazoo, flowers	6 00
Dec. 16.	242	G. E. Curtis, Kalamazoo, provisions	129 39
	244	Den. Bleyker Mnfg. Co., use of tables	3 75
			$242 04

Art Department.

Oct. 13.	98	J. F. Ells, Kalamazoo, labor	$4 87
	99	John Haus, Kalamazoo, labor	15 75
	145	A. J. Brow, Detroit, expenses of Mr. Brow and charges on pictures	42 60
	146	A. J. Baxter, Jonesville, Supt. Baxter and help	45 00
	184	George Downey, cartage on Torry pictures	2 25
	188	F. E. Woodward, insurance on pictures	20 00
24.	213	R. R. Howard, Detroit, freight on and boxing, etc., E. collection	125 65
			$255 62

Manufacturing Department.

Oct. 9.	107	F. L. Reed, Olivet, expenses of Snpt. Reed	$17 90
	140	Henry Fralick, G. Rapids, expenses of Supt. Fralick	12 00
			$29 90

Sheep Department.

Oct. 9.	112	D. W. Howard, Pentwater, expenses of Supt	$30 45

Gate Department.

Oct. 9.	108	Wm. Ball, Hamburg, expenses of Supt. Ball	$6 30
	109	Wm, Ball, Hamburg, board of Superintendent	11 50
	138	A. Fox, Kalamazoo, Gate Keeper	11 00

1885.	No. Order.	
Oct. 9.	154 Gate Keepers at Kalamazoo, pay-roll	$155 15
	155 Tom Barber, Fairfield, night Gateman	10 00
22.	201 Mrs. Eddy, Kalamazoo, board of Gatekeepers	35 00
		$228 95

Agricultural Department.

Oct. 9.	110 A. F. Wood, Mason, expenses of Supt	$19 80

Business Committee.

Oct. 9.	151 A. O. Hyde, Marshal, sundry trips to Kalamazoo	$17 50
	175 W. H. Cobb, Kalamazoo, expenses of Chairman	54 25
13.	186 Burdick House, Kalamazoo, board of committee	4 50
Dec. 16.	246 A. O. Hyde, Marshal, traveling expenses	11 20
	245 W. H. Cobb, Kalamazoo, R. R. fare and expenses	31 75
	248 J. B. Cobb, Kalamazoo, expenses to Monroe	10 70
	250 J. Sharp, Jackson, per expenses	8 25
	247 J. B. Cobb, clerk for Business Committee	200 00
		$338 15

Cattle Department.

Oct. 9.	120 I. H. Butterfield, Lapeer, expenses of Superintendent	$24 85
	121 I. H. Butterfield, Lapeer, expenses of Judges	15 00
	122 S. N. Wright, South Elgin, Ill., expenses of Judge	15 50
	123 Geo. Jackson, Indianapolis, Ind., Judge	20 00
	124 Thomas Clark, Beecher, Ill., expenses of Judge	13 50
		$88 85

Horse Department.

Oct. 9.	115 Geo. W. Phillips, Romeo, expenses of Judges	$52 45
	116 Geo. W. Phillips, expenses of Superintendent	10 80
	117 Geo. W. Phillips, board	17 00
	118 Geo. W. Phillips, board Assistant Superintendents	17 00
	119 Geo. W. Phillips, services and expenses of Asst. Supt	26 80
22.	207 W. S. Wilcox, Adrian board of Judge	3 50
Dec. 3.	217 W. S. Wilcox, Adrian, expenses of Judge	4 00
		$131 55

Music Department.

Oct. 9.	113 M. P. Anderson, Midland, expenses of Supt	$11 70
14.	114 Burdick House, Kalamazoo, board of Supt	17 50
		$29 20

Treasurer's Office.

Oct. 9.	158 Joel Waterbury, teams to and from Fair grounds	$8 00
22.	199 Burdick House, Kalamazoo, board Treas. and Clerks	65 00
	200 Mrs. Eddy, Kalamazoo, board Clerks	32 75
	208 A. J. Dean, Treas. Clerk pay-roll	167 50
Dec. 16.	229 A. J. Dean, Adrian, book-keeper	400 00
	230 A. J. Dean, Adrian, expenses during Fair	17 70
		$690 95

Dairy Department.

Oct. 9.	134 J. P. Shoemaker, Amsden, expenses of Supt	$23 80

Miscellaneous Department.

Oct. 9.	141 J. Sharp, Jackson, expenses of Supt	$30 20

Bee Department.

Oct. 9.	135 M. J. Gard, Volinia, expenses of Supt	$4 65
	136 M. J. Gard, Volinia, expenses of Supt	75
22.	212 M. J. Gard, Volinia, board of Supt	13 00
		$18 40

Poultry Department.

1885.		No. Order.		
Oct.	9.	137	Ambrose Purchase, Bay City, expenses of Judge	$20 00
		143	J. Q. A. Burrington, Tuscola, expenses of Supt	28 00
				$48 00

Needle Department.

Oct.	9.	139	Miss Minnie Brown, Detroit, expenses of Supt	$26 80
	13.	194	Burdick House, Kalamazoo, board, Mr. Judson	7 50
				$34 30

Swine Department.

Oct.	9.	142	John Lessiter, Jersey, expenses of Supt	$10 00
	22.	203	John Lessiter, Jersey, board of Supt	14 00
				$24 00

Carriage Department.

Oct.	9.	144	John Gilbert, Ypsilanti, expenses of Superintendent	$31 50

Machinery Department.

Oct.	9.	147	Wm. Chamberlain, Three Oaks, expenses of Supt	$26 75

Bill Posting.

Oct.	9.	152	John J. Bean, Marshall, posting bills	$3 20
	22.	219	C. Van Ostrander, Adrian, posting bills, Adrian	1 00
Dec.	16.	220	Bill Posters of Michigan, Ohio and Indiana	57 24
				$61 44

Tents.

Oct.	9.	159	Murry & Baker, Chicago, Ill., rent of three tents	$140 00
Dec.	16.	236	*John Hastings, Kalamazoo, freight on tents*	5 30
		239	Murry & Baker, Chicago, Ill., freight	1 15
				$146 45

Ladies Cottage.

Oct.	9.	162	Mrs. J. Phillips, Kalamazoo, attending cottage	$15 00

Check Room.

Oct.	9.	163	B. F. Armstrong, Kalamazoo, checking baggage	$15 00

Police.

Oct.	9.	167	Police pay-roll, labor nightman	$74 50
		170	Police pay-roll, policemen	244 25
Dec.	16.	237	Henry Brown, Climax, one day	1 50
				$320 25

Water.

Oct.	9.	173	Smith & Woodward, Kalamazoo, float valves	$2 40
		192	Thomas Dorgan, pipes, filling and labor	145 13
				$147 53

Decorating.

Oct.	9.	172	Geo. Taylor et. al., labor	$2 50
		195	M. Israel & Co., mosquito netting	26 64
				$29 14

Band.

Oct.	9.	178	Geo. D. Wedel, Fulton Band, 4 days	$100 00

Livery.

1885.	No. Order.		
Oct. 13.	183	M. D. Wande, Kalamazoo, livery	$10 00

Hardware.

Oct. 13.	196	Parsons & Wood, Kalamazoo, hardware bill	$104 14

Horticultural Society.

Oct. 9.	180	S. M. Pearsall, Grand Rapids allowance	$1,400 00

Lumber.

Oct. 13.	191	Bush & Paterson, Kalamazoo, repairs and lumber	$406 60

Ribbons and Badges.

Oct. 22.	206	J. V. Defor, Adrian, premium badges, etc.	$21 25

Reception Committee.

Oct. 22.	210	Philo Parsons, Detroit, expenses of Chairman	$6 80

Special Attraction.

Oct. 22.	212	Cady & Salsbury, Neb. Wild West, one-half of gate money, first day	$804 12

Express.

Dec. 10.	226	U. S. Express Co., Monroe, sundry charges	$18 94

Insurance.

Dec. 16.	243	F. E. Woodward, Kalamazoo, insurance on traps	$17 00

Summary Statement.

Winter meeting	$524 95
Switching	68 00
Lansing meeting	154 11
Implement department	78 20
Herd book	41 90
Secretary's office	1,426 55
Postage	95 20
Locating committee	27 30
Printing and advertising	1,214 85
Forage	1,111 90
Stationery	19 86
Building	1,353 43
General expense	197 43
Transportation	16 75
Meal tickets	212 32
Power	185 00
Marshal's department	160 10
Telegraphing	14 60
President's lunch room	242 04
Art Department	255 62
Gate department	228 95
Manufacturing department	29 90
Agricultural department	19 80
Sheep department	80 45
Business committee	338 15
Horse department	131 55
Cattle department	88 85
Music department	20 20
Treasurer's office	690 95
Dairy department	23 80
Bee department	18 40
Poultry department	48 00

Needle department	$34 30
Miscellaneous department	30 20
Swine department	24 00
Carriage department	31 50
Machinery department	26 75
Bill posting	61 44
Tents	146 45
Ladies' cottage	15 00
Check room	15 00
Police	320 25
Decorating	29 14
Water	147 53
Band	100 00
Livery	10 00
Hardware	104 14
Horticultural society	1,400 00
Lumber	406 50
Ribbons and badges	21 25
Reception committee	0 80
Special attraction	804 12
Express	18 94
Insurance	17 00
Total amount of orders	$12,848 42

Michigan State Fair Inventory.

1 Poultry house, 24x100 feet.
1 Apiary, 24x50 feet.
1 Pomological hall, 40x120 feet.
1 Horticultural hall, 24x100 feet.
1 Police office.
2 Express offices.
1 Check room, 8x12 feet.
2,600 feet lumber in two platforms for freight.
25 Rods plank sidewalk, 8 feet wide.
4,000 Feet of lumber.
588 Cattle stalls.
430 Sheep and swine pens.
350 Horse stalls.
800 Feed boxes and troughs.
Implement building, 50x250.
100 Fence posts.
400 Feet $\frac{1}{2}$ inch water pipe.
42 Bridge trees.
3 Wooden pumps.
2 Fountains.
2 Boxes short pipe.
46 Cut-off valves.
40 Faucets.
24 Caps for stand-pipes.
1 Pair pipe tongs.
1 Socket wrench.
3 Boxes mosquito netting.
1 Box decorating cloth.
1 Bushel basket.
1 Branding iron.
2 Boxes of miscellaneous articles.
3 Bundles of department flags.
1 Gallon jug.
2 Boxes hardware.
2 Tack hammers.
1 Nail hammer.
24 Drinking cups.
144 Poultry coops.
Half dozen new padlocks.
1,800 Feet $\frac{3}{4}$ inch water pipe.
1,700 Feet 1 inch water pipe.
1 Grindstone.
17 Water tanks.
2 Iron vices.
1 Sprinkling wagon.
2 Wheelbarrows.
1 Plow.
1 Drag.
1 Field roller.
1 Road scraper.
13 Lamp posts.
4 Iron pulleys.
2 Wooden pulleys.
500 Feet shafting.
1 Fire front.
1 Smoke stack and rods.
10 Wooden horses.
1 Box of hasps.
2 Gross $\frac{1}{2}$ inch screws.
1 Box of locks and keys.
1 Box of $2\frac{1}{2}$ inch staples.
1 Box 4 inch hooks and eyes.
1 Clothes boiler.
4 Tin pails.
2 Dish pans.
2 Sprinkling pots.
1 Looking glass.
10 Window curtains.
1 Lot mosquito bars.
21 Wiping towels.
20 Linen towels.
8 Linen table cloths.
1 Brown coffee sack.
1 Pair shears.
3 Doz. silver knives.
3 Doz. silver forks.
54 Silver teaspoons.
6 Butter knives.
3 Silver pickle forks.

Inventory.—Continued.

1 Stencil outfit.
Half barrel glass jars.
86 Jars of seeds.
9 Milk jars.
10 Street lamps.
1 Scoop shovel.
1 Hose Reel.
100 Feet of hose.
1 Hoe.
3 Pitchforks.
3 Spades.
2 Picks.
1 Mattock.
1 Snow shovel.
1 Straw fork.
2 Water keys.
1 Plantation bell.
1 Spirit level.
1 Square.
1 Adze.
2 Hand saws.
10 Water valves.
2 Coils of fence wire.
2 Gallons paint.
4 Paint brushes.
6 Large oil cans.
6 Small oil cans.
1 Blackboard.
24 Bed quilts.
14 Mattresses.
2 Bedsteads.
13 Tables.
32 Chairs.
6 Wooden signs.
12 Brooms.
1 Mop.
1 Pair iron legs.
1 Trace chain.
11 Ticket boxes.
1 Box lamp wicks.
3 Inkstands.
2 Boxes of locks and keys.
2 Fountain chains.
2 Cold chisels.
1 Package cup chains.
1 Log chain.
2 Kegs of nails.
1 Can of blind staples.
1 Coil of rope.
1 Pair of blocks with ropes.
2 Scythes.
1 Bush hook.
2 Wooden rakes.
2 Iron rakes.
1 Refrigerator.
4 Wash tubs.
10 Wooden pails.
3 Pigeon hole boxes.
13 Lamps.
13 Lanterns.
2 Doz. lamp chimneys.
2 Silver sugar tongs.
10 Silver tablespoons.
4 Mustard spoons.
23 Tin tablespoons.
1 Doz. tin teaspoons.
1 Large iron spoon.
5¼ Doz iron knives.
5½ Doz. iron forks.
3 Carving knives.
1 Steel sharpener.
1 Silver teapot.
3 Dripping pans.
2 Frying pans.
1 Cake pan.
¾ Doz. wash dishes.
1 Doz. tin pie plates.
4 Tin dippers.
2 Six-quart pans.
1 Crumb brush.
1 Scrub brush.
3 Table Servers.
1 Coffee Boiler.
1 Tea boiler.
1 Tea kettle.
3 Coffee pots.
3 Tin cups.
1 Large U. S. flag.
3 Medium U. S. flags.
2 Streamers.
3 President banners.
1 Pomological.
2 Machinery.
1 Fine art hall.
2 Ladies' rooms.
1 Dairy hall.
2 Crop correspondents.
1 Miscellaneous.
1 Secretary.
1 Press room.
1 Exposition.
2 Express.
1 Manufacturers.
1 Police.
2 Poultry.
1 State fair.
1 Lunch room.
1 Freight office.
1 Ticket office.
1 Entrance gate.
1 Children's department.
1 Fruit hall.
1 Apiary.
1 Baggage.
1 Farm and garden.
1 Agricultural.
2 Carriages.
1 Treasury.
1 Large pavilion.
1 Small pavilion.
1 Sandard pipe and hose for sprinkling wagon.

Booth Leases.

Date.	No.		Amount.
Aug. 21.	1	Presbyterian Church and Organ Society	$200 00
	2	N. S. Bauefield	48 00
	3	W. C. Tuthill	60 00
	4	Walter D. Groves	36 00
22.	5	W. F. Winterburn	36 00
	6	Rowley & Ralston	36 00
24.	7	Wm. D. McCormick & Dunkly	66 00
	8	Geo. Rounds	36 00
25.	9	H. G. Martin	36 00
	10	A. G. Holmes	36 00
26.	11	H. Angell, and J. H. Roeman	42 00
28.	12	John Manning	20 00
Sept. 1.	13	Abel Hoag	36 00
	14	Fred Formbum	10 00
2.	15	Shields & Williams	33 00
3.	16	Daniel Shea	36 00
4.	17	L. D. Canfield	30 00
7.	18	A. R. Costa	10 00
	19	Julius Vogel & Co	60 00
8.	20	W. J. Cummings	36 00
10.	21	A. R. Costa	5 00
	22	John Kendt	20 00
11.	23	G. W. Shellman	3 00
	24	W. A. Bail	12 00
12.	25	Jno. Burrows	20 00
	26	E. Schooner	5 00
14.	27	J. K. McGregor	30 00
	28	Fickes & Eickhoff	23 00
	29	E. C. Forrester	15 00
	30	E. D. Fox	15 00
	31	E. Roosa	20 00
	32	Dick Warren	30 00
	33	W. A. Strickland	5 00
	34	Edward McMakin	10 00
	35	G. A. Donaldson	100 00
	36	J. Larche	5 00
	37	M. L. Hamerink	10 00
	38	James Buth & Co	20 00
	39	I. M. Mittenthal	10 00
	40	I. N. Stone	5 00
	41	Braun & Shaup	14 00
	42	Mrs. P. E. Johnson	5 00
	43	D. Laudman	10 00
	44	M. M. Hughes & Bay	10 00
	45	M. E. Bartlett	30 00
	46	W. F. Bross	23 50
15.	47	Edson Kirkler	12 00
	48	R. A. Chapman	30 00
	49	C. & S. McMillan	5 00
	50	C. S. Benedict	6 00
	51	Benjamin Bateson	5 00
	52	Jewitt Williams	10 00
	53	Foot & Russ	24 00
	54	Kridel & Co	35 00
	55	Galloway & Hastings	10 00
	56	Thomas Atkins	3 00
	57	E. Butchgallobe	5 00
	58	E. W. Banks	3 00
	59	B. Maginecolda	6 00
	60	A. Maginecolda	6 00
	61	The Hurt Family	3 00
16.	62	Michael Morris	5 00
	63	D. P. Stacy	5 00
	64	J. H. Seward	1 00
	65	Wm. Winchel	6 00

Booth Leases.—Continued.

Date.	No.		Amount.
Sept. 16.	66	C. W. Zinn	$3 00
	67	Mrs. J. W. Morrill	2 00
	68	F. A. Garn	4 00
	69	J. R. Letner	5 00
	70	J. Marks	4 00
	71	M. R. Allen	10 00
	72	A. Miller	15 00
	73	W. J. Howard	10 00
17.	74	C. M. Woodward	2 90
	75	E. Lawrence	1 00
	76	C. E. Van Deusen	2 00
	77	W. J. Turrens	5 00
18.	78	E. Camp	1 50
	79	Charles Marmon	1 00
	80	James Hoagland	2 00
Total amount of Booth Leases			$1,606 00

All of which is respectfully submitted,

W. H. COBB.
A. O. HYDE.
JNO. C. SHARP.

The Secretary read the report of the Transportation Committee, which was accepted:

To the President and Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN—Your Committee on Transportation would respectfully report:

We made the best arrangements with the railroad companies that we could, still they were not quite satisfactory. For some years our Society has been favored with better railroad rates than other State Fairs have enjoyed—which made it the harder for us to submit to the change. There seems to have been quite a falling off in the sale of excursion tickets by the railroad companies. The total number sold by the M. C. R. R., G. R. & I., and L. S. & M. S. was 14,531. Over half of these were sold by the Michigan Central, the balance being about equally divided between the two other roads named. The amount paid for switching was $68.00; the expense of the Committee was $16.75. We would acknowledge valuable assistance from Mr. Sprong, agent of the G. R. & I., and our Secretary during the Fair, in making the receipt and shipping of stock a success, while the Chairman of the Committee was helpless at home. Mr. H. H. Hinds, one of our Assistant Marshals, also rendered valuable service in getting freight to and from the State Fair Station. Wishing you a pleasant meeting and regretting I cannot enjoy it with you,

I am respectfully,

J. M. STERLING,
Chairman.

President Chamberlain introduced the Hon. Franklin Wells, member-elect.

I. H. Butterfield, Superintendent of Division A, reported as follows:

DIVISION A—CATTLE.

To the President and Executive Committee of the Michigan State Agricultural Society:

The exhibition of cattle at the last State Fair was unusually good, both in numbers and quality.

The number of entries in each class, as shown by the books of the Secretary, are as follows:

Class.	Entries.
1—Shorthorns	166
2—Devons	60
3—Herefords	93
4—Jerseys	126
5—Galloways and Angus	54
6—Holstein Friesian	119
7—Grades	32
8—Fat Cattle	65
Non-enumerated	3
Total	718

A number of new exhibitors appeared, while a goodly number of the old ones came again. At least two breeds not now on the list have been introduced into the State and claim a place on the list. These are the Guernsey and the Red Polled Norfolk and Suffolk. Each has merit equal to some breeds now on the list. Three Guernseys, owned by one exhibitor, were on exhibition.

The falling off in the number of grade cattle is unexplained, since they constitute a large class of the cattle of this State, unless it be that the interest in the pure breeds is so greatly increased that the grades are neglected for show.

The large exhibit of fat cattle is gratifying, and the quality was exceptionally good. Exhibitors desire that calves be added to this list, in which I concur, the age to be 6 months and under one year.

Some difficulty is experienced in judging the dairy breeds, from the fact that exhibitors allow their cows in milk to go a long time without milking, previous to being shown, in order to show large udders. I think a rule to govern the time of milking previous to being shown would be useful.

A desirable addition to premiums would be for herds of young cattle bred by exhibitors.

I. H. BUTTERFIELD,
Superintendent.

Accepted and referred to Committees on Premiums and Rules.

Superintendent Geo. W. Phillips, of Division B, reported as follows :

DIVISION B—HORSES.

To the President and Executive Committee of the Michigan State Agricultural Society:

There were entered on the Secretary's books 317 horses for exhibition at the last State Fair, as follows :

Class.	Number Entries.	Class.	Amount Awarded.
9	6	9	$ 70
10	12	10	109
11	55	11	565
12	32	12	205
13	50	13	149
14	25	14	155
15	20	15	187
16	19	16	183
17	7	17	48
18	23	18	156
19	16	19	355
20	32	20	455
21	11	21	250
22	9	22	113
Total	317	Total	$2,802

Of the 317 horses exhibited, every one was a good one.

Premiums ample. Rules perfect.

I would call the attention of the Board to the note under class 15 and 16. This note reads, all horses 4 years old and over must weigh 1,600 pounds. This is all right for Clyde, but for Percheron mares, it's 200 pounds too high; for stallions it's all right. But mares will largely be suckling colts. But if they are not, it is a very large one of the breed that will weigh 1,600 pounds.

I recommend that the standard for mares be 1,400 pounds.

The expenses of my Department have been as follows for Judges:

W. S. Wilcox, $7.50; B. Proctor, $15; R. Coykendall, $15; J. W. Parkhurst, $4; J. Davidson, $14.45.

Expense of self and assistant at Burdick House, $34; and expenses of Judges, etc., $41,60; making a total of $131.55, against $229.61 in 1884.

Superintendent Lessiter, of Division D, read the following report:

DIVISION D—SWINE.

To the President and Executive Committee of the Michigan State Agricultural Society:

In Class D, Swine, the number of entries at the last Fair was 151; last year 315—the low price of pork has no doubt lessened the interest in this department. The entries in the several classes are as follows: Berkshires, 11; Essex, 21; Suffolk and Small Yorks, 2; Poland Chinas, 74; Chester White and large Yorks, 26; Jersey Reds, 3; Fat Hogs, 6; Victorias, non-enumerated, 8. Amount of awards in this division, $460.

The exhibits generally were very good. I have no recommendations to make.

Respectfully submitted,

JOHN LESSITER,
Superintendent.

Accepted.

Superintendent Burrington, of Division E, read his report, which was accepted and referred to the Committee on Premiums:

DIVISION E—POULTRY.

To the President and Executive Committee of the Michigan State Agricultural Society:

As Superintendent of Division E, I submit the following report:

The number of entries in this Division at the State Fair of 1885 was 249. At the Fair in 1884 there were 541 entries, showing a falling off at our last Fair of 292. This may be accounted for in part by the fact that application for over one hundred entries was made too late to be received under the rules of this Society, and partly on account of some large exhibitors at our Fair in former years attending the Illinois State Fair at Chicago, held on the same days as our own.

The amount of premiums offered in this division was $257; amount awarded in the regular classes, $178; discretionary, $10; total, $188.

The exhibit was confined wholly to Michigan breeders, and was in all respects, except in numbers, very meritorious. The quality was, I think, far superior to that at any former Fair since I have been connected with this Society. Some changes should be made in the premium list, which, however, will not add to the amount we have to pay. Some entries appear every year in the non-enumerated list, which have become so well established that they should be recognized in our regular list.

Respectfully submitted,

J. Q. A. BURRINGTON,
Superintendent.

Superintendent Baxter, of Division N, read his report, which was accepted and referred to Committees on Premiums and Rules.

DIVISION N—ART.

To the Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN—As Superintendent of Division N, Classes 61 and 62, I have the honor to report that the entries in Class 61 were unusually numerous, and embraced in both professional and amateur lists many paintings of superior excellence.

Number of entries, 283; premiums offered, $562; premiums awarded, $428.

This includes discretionary premiums recommended and sanctioned by vote of Executive Committee during the Fair.

In Class 62 there were but four entries. Premiums being left discretionary, no premiums were awarded. In order to secure a creditable exhibition in the professional list, inducements in the way of payment for boxing, freight and insurance had to be offered, as has been customary for several years past. Your committee in charge, after consulting with the President of the Society, took the responsibility of promising the payment of such expenses. He suffered some annoyance and mortification in having bills

for such expenses, certified by him as correct, rejected by the Business Committee, though the same were subsequently, after full explanation by Superintendent in charge, paid.

It may be that this Department has been more expensive than the Executive Committee deem advisable. Your Superintendent can only say that he has regarded it as a very interesting and valuable feature of our annual Fairs; has always, when in charge, given it his constant and undivided attention and endeavored to make the most of it.

The Viewing Committee, composed of some of the most experienced and competent judges in this class of exhibits, have for two successive Fairs suggested a change in premium list, placing professional exhibits in a list separate from the amateur list, and your Superintendent has on such occasion joined in such recommendation. The matter has doubtless been overlooked by Committee on Premium List, but I trust the suggestion will be adopted. It is very discouraging and hardly fair to amateurs to be compelled to compete with those who, with all the advantages of education and culture, have devoted their lives to the profession. Neither class should be excluded, but should not be as now, required to compete in the same class.

To avoid the annoyance that has arisen by a necessity on the part of the Superintendent in charge, in order to secure a creditable exhibition in the professional department, making promises to pay expenses of boxing, transportation, insurance, etc.—promises which may be repudiated by the Business Committee—your Superintendent would suggest offering for the art collection of paintings, not less in number than 100; a first and second premium sufficiently large to meet all such expenses and still prove a stimulus to professional artists and collectors to make an exhibit.

Respectfully submitted,
W. J. BAXTER,
Superintendent of Division N.

Superintendent Anderson, of Division M, offered the report of the department as follows:

DIVISION M—MUSICAL INSTRUMENTS, ETC.

To the President and Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN—The Superintendent of Division M, Classes 58, 59 and 60, begs leave to make the following report:

Class 58, there were 45 entries; no awards. Classes 59 and 60 no entries were made. In Class 58 the display was very satisfactory and very much larger than in former years. Exhibitors were well pleased, and from the growth of interest taken it must be perfectly satisfactory; therefore I would advise no change in the rules.

Respectfully submitted,
M. P. ANDERSON,
Superintendent.

Accepted.

The Secretary read the report of Miss Brow, Superintendent of Division O, and Q., as follows:

DIVISIONS O AND Q—NEEDLE WORK AND CHILDREN'S DEPARTMENT.

To the Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN—The display of work in Division O was never finer than at the Fair of 1885, and will warrant a continuance of this department, which has proved so instructive and entertaining. Entries in Division O numbered 443, and premiums awarded $263.50. Division Q, entries 30, premiums $18.50. The premium list is quite complete, and according to the best judgment of your Superintendent, needs no revision at this time, excepting the introduction of a clause, stating that work done by sewing-machine operators will not be allowed to compete with that done by amateurs. The absence of such a rule was the occasion of some confusion and considerable misunderstanding at our last Fair.

The above is respectfully submitted,

MINNIE H. BROW,
Superintendent.

Accepted and referred to Committee on Premiums.

The report on manufactured goods, Division L, was presented by Messrs. Fralick and Reed.

To the President and Executive Committee of the Michigan State Agricultural Society:

The exhibition in some of the classes in this department was full and creditable, in others small but mostly good.

The Hall afforded sufficient and suitable room for all exhibitors, and was well arranged. Whole number of entries in Division, 149; whole amount of premiums awarded, $142.

The Division comprises classes 52 to 57, inclusive.

In class 52, "Materials," there were 19 entries, 14 of wool, 5 of flax. The wool exhibit was very good; premiums awarded on wool, $39. We recommend that more careful attention be given to the note attached in the premium list, which reads as follows: "That the fleece from which the samples are taken, age, sex and breed of the sheep, and the breeder's name be shown on a card attached to each display."

Flax, 5 entries, 6 samples exhibited. Some very good; premiums awarded $13.

Class 53, factory-made goods; no premiums offered; small exhibit. We would recommend that a liberal first and second premium be offered for the best display of goods of their own make of any woolen, cotton or oilcloth factory in this State, as the encouragement, especially of such manufactures in our State, is very desirable.

Class 54, articles of dress goods; no premiums offered; small, but good exhibit.

Class 55, articles of leather and india rubber goods. In most of this kind of articles the exhibit was small, except in the display of boots and shoes, which was large and very good. Premiums awarded, $20; discretionary premiums awarded in this class, $8.

Class 56, articles of furniture; display and quality good. Premiums awarded, $62.

Class 57, stoves, iron work and ornamental concrete works. The display of all kinds of stoves, ranges, furnaces, floor tile, mantels, solid bronze, and door trimmings, and many other articles of that class of goods, was very large and good. The manufacture of stoves and ranges of all kinds and varieties is a great and important business, especially in the City of Detroit, and in some of the interior towns, the goods finding an extensive sale, not only in all parts of our own country, but in foreign lands, thereby attesting their superiority. The course adopted some years ago by this Society, to offer no premiums on stoves, has resulted in *no* loss of interest at the Yearly Exhibitions of this Society.

There is a very large class of articles embraced in this division of manufactured goods which are yearly exhibited at our Fairs, on which there is no premium offered; but a large share of the articles are valuable products to the manufacturers, and of great utility to the consumer, and we recommend that a liberal policy be pursued by this Society for their exhibition, by providing ample and proper room and other reasonable facilities to such exhibitors in this department.

All of which is respectfully submitted,

HENRY FRALICK,
F. L. REED,
Superintendents of Manufactured Goods.

Accepted and referred to Committee on Premiums.

Superintendent Hanford read the report of Division I, as follows:

DIVISION I—FARM IMPLEMENTS.

To the President and Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN—Owing to several quite unfavorable circumstances, it was thought by many that the Farm Implements Department would be poorly represented at our last State Fair. The low price of wheat and wool for the last two or three years, together with the large amount of corn that was imported into the State during the winter of 1884, for farmers' use, caused trade in many lines of agricultural implements to fall off quite materially. With this loss of trade came the additional expense of half freight rates to and from the Fair, which we had reason to fear would keep heavy articles from coming. We have the pleasure of reporting, however, a very general attendance of exhibitors, with a full line of implements in the several Classes. Sixty-six firms and individuals made 273 entries in time to be printed in the catalogue. Eighty-seven firms, many of them the largest exhibitors at the Fair, are only known as members of the Society. Our exhibit was equal in numbers and merit to that of any previous Fair, in fact, surpassed them in some points; but when perfection is nearly reached, we cannot expect the radical improvements we have seen, since I first had the honor

of representing this department as an Executive Member. The Department of Farm Implements has at least kept up with the growth of other departments, not only in style of articles shown, but in their intrinsic value to the farmers of the State.

The new rule for the giving out of attendance tickets, adopted at our last winter meeting, worked satisfactorily to the exhibitors, and saved the Superintendents a great amount of labor in our department.

There has been considerable discussion in the papers about a Fair Circuit, mostly *condemning our past arrangements with other State Associations.* The *arrangements* that have heretofore been made for our department, enabling exhibitors to ship their articles from other States to our Fair, and from here to other Fairs, without being sent back to first place of shipment, has certainly worked well for our exhibitors, (however it may have affected other departments), and we hope will not be changed without due consideration. Exhibitors were generally well pleased with their locations and the arrangements of the grounds, very little fault with the water supply and none with the shafting.

And now, before retiring from acting as chairman of this department, I wish to express to the Officers and Members of the Executive Committee my great obligation for their uniform kindness and courtesy, which one and all have shown me since I first took charge of the department, and bespeak for my successor the same kind consideration. While I have made many mistakes, I have tried to use every exhibitor with fairness, and I leave the active management of the division, feeling that I have the respect of exhibitors that have been with us so long.

Respectfully submitted,

H. O. HANFORD,
Chairman.

Accepted.

Superintendent Gilbert presented the following report for Division J:

DIVISION J—VEHICLES.

To the President and Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN—Your Superintendent of Division J, Vehicles, would report as follows:

There were 209 entries in this department, of which 175 were carriages, sleighs and road-carts, requiring covered space, and for the first time in a number of years there was room to accommodate them all, and the exhibitors were well pleased. The three large tents furnished for the department, measuring over 12,000 feet, floor surface, and being nearly five times the amount of space in the buildings heretofore furnished, were filled to their utmost, some firms exhibiting over 40 carriagés. The large amount of space used would suggest the propriety of limiting the exhibitors in the number of vehicles they should exhibit.

I think the tents used were too large and not sufficiently strong to stand a high wind, but if properly made they might be used to good advantage.

Respectfully,

JOHN GILBERT,
Superintendent.

Accepted and referred to Committee on Premiums.

Superintendent Gard, of Division H, reported as follows:

DIVISION H—BEES, HONEY, ETC.

To the President and Gentlemen of the Executive Committee of the Michigan State Agricultural Society:

As Superintendent of Division H, Bees and Honey, I have the pleasure of submitting the following report: There were 79 entries and $279 awarded. On account of so many bees dying the previous winter the exhibit of honey was not so large as last year. There was a large crowd of visitors in Apiary Hall during each day of the Fair, and judging from the numerous questions asked in relation to the management of bees, there is a growing interest taken in that industry. By request of some of the bee men of the State, I procured the assistance of Mr. H. B. Cutting to work up the exhibit and assist in the management of the department. I think it was due to his energy and perseverance that the exhibition was so good under such unfavorable circumstances. In consideration of his valuable services I gave him $10. Both exhibitors and visitors were sat-

isfied with the arrangement and management. There were no complaints that came to my knowledge. I would recommend that the Society provide a similar, or suitable building, and offer the same premiums as heretofore. This growing industry I think is entitled to a reasonable share of encouragement from this Society.

All of which is respectfully submitted.

M. J. GARD,
Superintendent Division H.

Accepted and referred to Committee on Premiums.

Mr. Anderson moved that the addresses of the retiring and incoming Presidents be referred to a committee of five for a division of subjects.

On motion a recess was taken until 9 A. M. Tuesday.

J. C. STERLING,
Secretary.

SECOND DAY.

RUSSELL HOUSE,
DETROIT, Jan. 12th, 1886.

The committee resumed its session this morning, President Chamberlain in the chair.

Roll call and the following members found present:

President Chamberlain, Messrs. Hanford, Ball, Lessiter, Cobb, Sharp, Hyde, Reed, Gard, Burrington, Shoemaker, J. P. Angel, Howard, Young, Butterfield, Gilbert, Anderson, Wells, Baxter, Humphrey, Philips, Fralick, Parsons and the Secretary.

Moved and supported that the reading of minutes be dispensed with.

Superintendent Howard, Division C, reported as follows:

DIVISION C—SHEEP.

To the President and Executive Committee of the Michigan State Agricultural Society:

The Superintendent of division C, Sheep, would respectfully report. The number of entries was not as large as the previous year. The number of entries this year was three hundred and ninety-three, and the number and awards in the several classes were as follows:

Class.	Entries.	Amount awarded.
23	53	$304 00
24	58	214 00
25	28	91 00
26	39	134 00
27	53	154 00
28	60	152 00
29	20	141 00
30	25	137 00
31	32	57 00
32	25	115 00
Total amount awarded		$1,499 00

At our last Fair, under the rule charging ten cents per pen, many exhibitors secured as many pens as they made entries. I think if this rule is continued it will necessitate a large expense to the Society, in building a large number of pens more than we do under the free pen system. Therefore I would recommend free pens, and that they be left in the control of the Superintendent in charge.

Yours respectfully,
D. W. HOWARD,
Superintendent.

Accepted and referred to Committee on Rules.

The Secretary read Superintendent Wood's report for Division F:

DIVISION F—FARM AND GARDEN PRODUCTS.

To the President and Executive Committee of the Michigan State Agricultural Society:

Division F, Farm and garden Produce and Manufactured Products, reports as follows: Class 35, grain and seeds. There were 70 entries; $245 offered; $179 awarded. I would recommend dropping from this class the sample of hops, bushel of any new variety of grass seed and display of a collection of several kinds of grain in head with stool and roots entire. I would also suggest that in wheat, and perhaps oats, instead of white and red wheat, I would name the standard varieties and offer a prize of $3, $2 and $1, instead of our present list. Corn I would also classify in the standard varieties and offer on 12 ears instead of a bushel, and make the premiums accordingly.

In Class 36 there were offered $281; 184 entries: $221 awarded. In this class I would recommend the dropping of collections and name standard varieties.

In Class 37 there were offered $155; paid $105. In this class I would add a note that the same competitor or gardener shall not compete for more than one premium offered. If it is best to encourage the raising of new sorts of potatoes and testing a large number of varieties by individuals, I would add a premium for such in this class.

In Class 38 $50 were offered; $39 awarded. If I were to make any change I would take some from single barrels of flour and add to display. There was also a display premium paid for county collection of $25, making offered in this department $731, and awarded $569. All of which is respectfully submitted.

A. F. WOOD,
Superintendent.

Accepted and referred to committee on premiums.

Superintendent Shoemaker read his report as follows:

DIVISION G—DAIRY ARTICLES.

To the President and Executive Committee of the Michigan State Agricultural Society:

As Superintendent of Division G, Classes 39, 40 and 41, I would make the following report:

The exhibits of dairy products was not large, but of good quality: there were but two entries of cheese; they were of good quality and creditable to the makers. The display of creamers and other dairy implements was fine, and proved the chief attraction in the hall. The showing of butter and bread was good, though not large; but from the way they are obliged to be shown are not much of an attraction to the hall, as it consists principally of jars, tubs and bundles of bread, kept closed to avoid handling and dirt. There was a small but fine display of maple sugar and syrup. There were no exhibits in Class 41; the space was ample and good feeling prevailed. The whole number of entries was 100, classed as follows:

Class.	*Entries.*	Premiums. Awarded.
39	52	$110
40	46	54
41	2 Not placed on exhibition	....
Total Premiums		$164

Total amount of premiums offered, $219.

All of which is respectfully submitted,
J. P. SHOEMAKER,
Superintendent of Division G.

Accepted.

Superintendent Ball read the following report which was accepted and referred to Committee on Rules:

GATES.

To the President and Executive Committee of the Michigan State Agricultural Society:

The Superintendent of Gates would respectfully report that general good order prevailed at the gates, and the gatekeepers were diligent in the discharge of their duties.

The method, as now pursued, of receiving tickets of all kinds at any or all of the gates, is of doubtful expediency. The abandonment of the plan adopted a few years ago in Detroit, of requiring the attendants' tickets to be taken at a certain gate, without a more extended trial was not good policy. Though not by any means a perfect system, still it was generally conceded that it was a vast improvement upon the old system, and did much good, and saved money to the Society and largely assisted in preventing the misuse of Attendants' tickets. Why the plan was abandoned, after so many of the Directors spoke favorably of its workings, is as inexplicable as many other things that transpire in the official transactions of this Society.

As a financial question, the rules that govern the admission of people to the Fairs of the Society, is an important one, and the greatest necessity exists for some plan, that shall proportion the receipts of the Fair to the number of people who are admitted through its gates, during its continuance. The large number of people who are believed to have attended the Fair last fall, and the lightness of the receipts at the gates have caused a good deal of comment, and I fear justly so. The question arises, What are the causes? They are not to be found in the Treasurer's department, for the Treasurer is charged for every ticket that goes into his possession, and he must return every unused ticket to the Financial Committee, and those used must be accounted for at their face value in money, at the close of the Fair, or before his accounts are settled by said Committee, the Treasurer being obliged to make good any or all mistakes of his clerks or himself, and being under good and sufficient bonds for the faithful performance of his duties. We must then look elsewhere for the trouble. After carefully watching the matter for a number of years, and observing the numbers who go in at the gates, I am of the opinion that some part of this real or apparent deficiency is due mainly to two causes. First, the large number of complimentary tickets possessed by those going through the gates, which the gatekeepers must accept. That the number of these tickets used last fall was inordinately large, I know, from the fact, that so many were presented at the gates, and accepted. If any doubt exists in the minds of the Directors, they can easily satisfy themselves on that point by examining the contents of the ticket-boxes. By what authority these tickets are so largely distributed, I have failed to discover.

A marked feature in this matter is, that so many are presented by persons living in the towns where the Fairs are held, and who by their expensive carriages and equipments are perfectly able to pay their fares, and who have no more right to these tickets than the poorest washer-woman who, if she sees the Fair at all, has to pay her hard-earned fifty cents.

Another cause of this discrepancy arises from the fact that so many attendants' tickets are fraudulently used by persons who have no right to them. That Superintendents who issue them are oftentimes imposed upon is true, and it can hardly be avoided; but that well-dressed ladies, three in a carriage, of good pattern, drawn by a good horse well caparisoned, should go through the gates each presenting a yellow ticket on which there is no value, is a glaring fraud; and this is no exceptional case, as any or all of the gate-keepers at the main gates will testify.

The question will be asked, How can this be remedied? The answer is easy: Some rule forbidding the printing and use of complimentary tickets to any extent. Make somebody responsible for their good use (if necessary at all), and say to whom such tickets shall be issued and for what purposes, and you will have taken a step in the right direction.

As to the attendants' tickets, would say, have one gate where they must be presented to be good, and not wide enough to pass a carriage; also that no female be allowed to pass the gates with such a ticket, and if presented, take it and keep it, but do not allow her to pass on it, for it represents no value. If lady attendants need something to pass them, have tickets for their especial use.

It is no pleasant task to make such a statement, but such are the facts as I see them. I have also learned that to get abuses remedied it is necessary to speak plain. I have tried honestly and fearlessly to point out two causes which seemed to demand investigation, and which if true should be remedied; and it will require the best thought of this Board to grapple with it in a manner that will stop their future abuse, and at the same time be for the best interests of the Society.

My opinion has not been formed from last fall's experience alone, but strengthened.

All of which is respectfully submitted.

WILLIAM BALL.

Superintendent Sharp, of Division P, reported as follows:

DIVISION P—MISCELLANEOUS.

To the President and Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN—The undersigned Superintendent of Division P, Miscellaneous Department, would respectfully report as follows:

The number of entries in Class 68 were 25, and in Class 69, 19; total entries, 44. The premiums awarded in Class 68 were $15; and in Class 69, $5; total $20. The number of entries was only two more than one-half the number for the Fair of 1884; the reason therefor the Superintendent is unable to give, having heard none assigned by exhibitors or officers. Not having seen the exhibits in 1884 or prior thereto, he cannot state how the exhibit compared with former years; he can only say that both as to kind and quantity it was a disappointment to him. There are 54 articles enumerated in the premium list and 44 cash premiums and two medals offered, yet there were only six entries of any of those articles, and in none of them any competition. Of those six entries only one could compete for premiums because of improper entry.

The space allotted to the department was more than ample for its needs, yet not entirely satisfactory to some of the exhibitors. To such of those, permission was given to find a place for themselves in other departments. The trouble in hunting up those exhibitors for the viewing Committee was offset by the satisfaction of knowing that they had been helping fill up the vacant places in some other department.

The Superintendent, having had only the experience gained at the Fair of 1885, does not feel at liberty to offer any suggestions or recommendations having for their object the improvement of the department in the future, to a body of men who have grown grey in the service of this Society, and feels that his duty is done by reporting the facts, confident the remedy, if any is desired, will be evolved from the experience of your honorable body.

Respectfully submitted,

JOHN C. SHARP,
Superintendent.

Accepted and referred to Committee on Premiums.

Chief Marshal Hyde reported as follows:

To the President and Executive Committee of the Michigan State Agricultural Society:

We respectfully submit the following brief report: At the last State Fair, held at Kalamazoo, we seemed to get along without any especial hard work. There was no lack of time for getting through with those branches or departments of the exhibition coming directly under our supervision. In fact, the horse and cattle departments are so thoroughly systematized under our well arranged programme, that we find no trouble in keeping up with the work, provided that our excellent and efficient Superintendents in those departments give us good, fairly alive judges. We mean men that have an eye to business, who, having reached a decision will say so, and thereby largely aid in dispatching the work we have to do. The above remark is not made in a fault-finding spirit, by any means. We have had some of the best judges in the country, willingly devoting their time to promoting the best interests of the Society we represent. The work in our department is made comparatively easy by our efficient and experienced Assistant Marshals, Messrs. Hodge, Hinds and Kelsey, each and every one of them capable of managing any exhibition held on the Fair grounds.

The percentage of order-loving people in large public gatherings in Michigan so far outnumbers any other element that they only want to know what is reasonably asked of them to render a cheerful compliance.

A. O. HYDE,
Chief Marshal.

Report accepted.

Superintendent Cobb reported as Superintendent of Police.

POLICE.

To the President and Executive Committee of the Michigan State Agricultural Society:

Your Committee on Police would report as follows:

We employed about 35 police and watchmen for day and night work; it required more men this year, as we got but little help from the city, except for special duty, and that was very promptly furnished when asked for. This report will include the night watch and police, as well as day police. The price paid per day was $1.50, with a few exceptions, where more was paid for extra services. There was not a single arrest

made for drunkenness on the ground, and the only arrests made were for breaking into the grounds unlawfully.

Your committee realizes the fact that a great amount of trouble was saved the Police Department by the strict adherence to the rule made by the Executive Committee that they would not lease any booth for purposes of selling any kind of spirits, and if any liquors were kept on sale on the grounds, it was not in a place so rented by the Business Committee or their agent. The grounds were cleared at 6 o'clock, or soon after, at which time the night police were stationed, and general good order prevailed, as far as your committee can report.

Your committee take pleasure in saying the Mayor and Common Council of the City of Kalamazoo aided them promptly whenever called upon to do so.

The expense shown in this department may seem large, but when it is understood that it embraces all the men that were employed to watch the fences and do all extra work, in the buildings and out of them, it will show why so many men were employed. Your committee would say further that the services rendered by Mr. Chas. Jennings was most valuable, and was highly appreciated by the Superintendent.

Respectfully submitted,

W. H. COBB,

Superintendent.

Report accepted.

President Chamberlain appointed the following committees:

On Premiums—Messrs. I. H. Butterfield, Charles W. Young, Henry Fralick, J. P. Shoemaker, D. W. Howard, John C. Sharp, and Geo. W. Phillips.

On Presidents' Addresses—Messers. M. P. Anderson, W. J. Baxter, J. Q. A. Burrington, H. O. Hanford and F. L. Reed.

Upon motion of Mr. Lessiter, the report recommending a discretionary premium of $20 on Victoria Swine, tabled at a meeting of the committee on September 18th, was taken up. It was moved and supported that the recommendation of the Superintendent be adopted.

The motion was carried by the following vote:

Yeas—President Chamberlain, Messrs. Ball, Lessiter, Cobb, Sharp, Hyde, Reed, Burrington, Shoemaker, J. P., Howard, Young, Butterfield, Anderson, Wells, Baxter, Humphrey, Phillips—17.

Nays—Messrs. Hanford, Gard, Angel, Fralick, Parsons—5.

Mr. Humphrey was called to the chair.

President Chamberlain tendered his resignation as a member of the Committee, and recommended as his successor Mr. J. M. Turner, of Lansing.

Upon motion the resignation was accepted and the recommendation tabled.

Mr. Sharp moved that we proceed to the election of a member to fill the vacancy caused by Mr. Chamberlain's resignation.

Carried.

Messrs Wells and Sharp were appointed tellers.

Result of the ballot:

James M. Turner received	18
Henry Chamberlain received	2
Richard Moore received	2
Total	22

Mr. Turner was declared duly elected, and the Secretary instructed to notify him of his election.

Mr. Parsons announced to the Committee that Messrs. Whitney and McKnight had tendered the members tickets to the theatre for this evening.

Upon motion of Mr. Cobb the invitation was accepted with thanks.

Upon motion a recess was taken, to meet at 2 o'clock P. M.

AFTERNOON SESSION.

The Committee reassembled at 2 o'clock, President Chamberlain in the chair.

Roll called.

Present, President Chamberlain, Treasurer Dean, Messrs. Hanford, Ball, Lessiter, Cobb, Sharp, Hyde, Reed, Gard, Burrington, Shoemaker, J. P., Angel, Howard, Young, Butterfield, Gilbert, Anderson, Wells, Baxter, Humphrey, Phillips, Fralick, Parsons and the Secretary.

The President announced the following standing committees:

Committee on Rules—Messrs. Ball, Hyde and Angel.
Committee on Finance—Messrs. Anderson, Wells and Lessiter.
Committee on Printing—Messrs. Dean, Sterling and Baxter.

Treasurer Dean reported as follows:

TREASURER'S REPORT.

Fair held at Kalamazoo, September, 1885.

RECEIPTS.

January, 1885, Balance cash on hand			$15,086 03
RECEIPTS DURING THE CURRENT YEAR.			
Membership Certificates	$695 00		
Admission (Gates)	15,039 15		
W. H. Cobb, Chairman:			
Ground and Booth Rent	1,605 90		
Check Room	54 95		
Sundries	46 10—	$17,441 10	
J. C. Sterling, *Secretary:*			
Stall Rent	396 30		
Sale of Catalogues	22 20		
Life Membership	10 00—	428 50	
Sale of $3,000 U. S. Bonds, "Premium"		880 00	
Interest Account		400 00—	$19,149 60
			$34,235 63

DISBURSEMENTS.

Business Orders	$12,842 07	
Premium Checks	10,497 00	
" " 1884	8 00	
Horticultural Premium Checks	999 75	
Balance Cash on hand	9,888 81—	
		$34,235 63

NOTE—Of the above balance cash on hand, there is invested in the name of the Society six thousand dollars, (face value) in four (4) per cent. registered United States bonds.

A. J. DEAN,
Treasurer.

Accepted and referred to Committee on Finance.

Mr. Fralick was called to the chair.

Superintendent Chamberlain, of Division K, made his report as follows:

DIVISION K.—MACHINERY.

To the Executive Committee of the State Agricultural Society:

GENTLEMEN—As Superintendent of Division K, I have to report a very meagre exhibit in this department for two years, and am of the opinion it would be well for the Society to offer a liberal premium for the best display in Class 50. A good exhibit in

this department would be interesting, and I think it might be an inducement to manufactures to make a display if such a premium was offered.

Respectfully submitted,
WM. CHAMBERLAIN.

Accepted and referred to the Committee on Premiums.

President Wells, of the State Board of Agriculture, extended an invitation to the committee to visit the State Agricultural College during the summer.

On motion the invitation was accepted, the time for such visit to be named by the President, Secretary, and Treasurer.

The Committee on the Presidents' addresses offered the following report:

To the President and Executive Committee of the Michigan State Agricultural Society:

Your Committee to whom were referred the addresses of the retiring and incoming President for distribution, would respectfully recommend:

First—So much of said addresses as refers to licensing side-shows and entertainments be referred to the Business Committee.

Second—That so much as refers to striking out the third and fourth Premiums be referred to Committee on Premium Lists.

Third—That so much as refers to the nomination and election of officers and to the retention or dropping of ex-Presidents from membership of executive committee, be referred to the Committee on Rules; that if on examination any change is deemed advisable they may recommend the same and amend the rules accordingly.

Fourth—So much as refers to the relations of the State Society to the Agricultural College, be referred to Committee on Agricultural College.

Fifth—So much as refers to State Fairs Circuit, referring to the relations of this Society with other State societies, be referred to a special committee of three, to be hereafter appointed by the President.

Sixth—So much as refers to State Horticultural Society be referred to a special committee of three, to consult with a like committee from the Horticultural Society when appointed, and to report.

Seventh—So much as refers to putting the several departments under a single Superintendent for the week previous to the Fair, be referred to Committee on Rules—to examine into the feasibility and advisability of the change, and report by rule or otherwise.

Eighth—The matter of establishing one or more places for permanently holding the Fair, be referred to the Special Committee heretofore appointed for that purpose.

That said Committee be instructed, in case they recommend a permanent location, to further report whether it is advisable to ask State aid, and the method of asking the same.

All of which is respectfully submitted.

M. P. ANDERSON.
W. J. BAXTER.
H. O. HANFORD.
J. Q. A. BURRINGTON.
F. L. REED.

It was moved and supported that the report be accepted and adopted, with the exception of so much of it as relates to the question of permanent location.

The motion prevailed.

It was then moved and supported that that part of the report relating to permanent location be laid upon the table.

Upon motion the Committee on Permanent Location, appointed at last winter meeting, was discharged.

Mr. Sharp moved that a committee of five, of which the President shall be chairman, be appointed on permanent location.

Carried.

Mr. Baxter then moved that the Committee on Permanent Location be requested to report at this meeting upon the advisability of locating permanently in one or more places.

Carried.

Recess until 9 o'clock Wednesday morning was then voted.

THIRD DAY.

RUSSELL HOUSE,
DETROIT, January 13, 1886.

The Executive Committee resumed its session at 9 o'clock A. M. as per recess taken. President Chamberlain in the chair.

Present—President Chamberlain, Treasurer Dean, Messrs. Rising, Hanford, Ball, Lessiter, Cobb, Sharp, Hyde, Reed, Gard, Burrington, Wood, J. P. Shoemaker, Angel, Howard, Young, Butterfield, Gilbert, Anderson, Wells, Baxter, Phillips, Fralick, Parsons and the Secretary.

The President announced the following special Committee on Permanent Location—Messrs. Ball, Dean, Hyde, Wells and Parsons.

On that part of the President's addresses relating to the State Horticultural Society—Messrs. Hanford, Cobb and Reed.

The Secretary read a communication from Alexander Edmonds and Boody & Lee, asking that Ayrshire cattle be given a place in the Premium List, on an equal footing with other breeds.

The communication was, on motion, received and referred to the Committee on Premiums.

The Finance Committee reported as follows:

To the President and Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN—Your committee to whom was referred the report of the Treasurer, would state that they have made a careful examination of the same, have compared and examined the vouchers, finding the account with this Society correct as reported by him. We would further state he has furnished bonds to the amount of $30,000, which have been approved by us. During the past year the Treasurer has negotiated the sale of $4,000 of the $10,000 4 per cent. government bonds, and as they were registered in the name of this Society we recommend that a resolution be passed ratifying the sale.

All of which is respectfully submitted.

M. P. ANDERSON,
FRANKLIN WELLS,
D. W. HOWARD,
Committee on Finance.

Accepted and adopted.

Mr. Anderson offered the following:

Resolved, That the Treasurer be and is hereby authorized to negotiate the sale of $1,000 or more of the government bonds now in his hands, when in his judgment it seems necessary.

Adopted by the following vote:

Yeas--President Chamberlain, Messrs. Rising, Hanford, Ball, Lessiter, Cobb, Hyde, Reed, Burrington, Wood, Shoemaker, J. P., Angel, Howard, Young, Butterfield, Gilbert, Anderson, Baxter, Phillips, Fralick, Parsons—21.

Nays—Sharp, Gard, Wells—3.

Superintendent Rising, of Forage Department, reported verbally that he had no recommendations to offer.

The committee then took a recess until 2 o'clock.

AFTERNOON SESSION.

The meeting was called to order at 2 o'clock, President Chamberlain in the chair.

Quorum present.

Mr. Anderson, chairman of the Committee on Finance read the following reports:

To the President and Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN—Your Committee to whom was referred the accounts of the Business Committee, would respectfully report that they have made a careful examination of the same and found them correct as reported.

M. P. ANDERSON,
FRANKLIN WELLS,
D. W. HOWARD,
Committee on Finance.

To the President and Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN—Your committee to whom was referred the account of the Secretary, would state that upon careful examination of his books and vouchers we found them correct as reported.

We also state that his bond to the amount of $1,000 has been examined and approved.

All of which is respectfully submitted.

M. P. ANDERSON,
FRANKLIN WELLS,
D. W. HOWARD,
Committee on Finance.

Reports accepted and adopted.

The committee then took a recess until 7 o'clock.

EVENING SESSION.

The Committee met at 7 o'clock, according to recess taken. President Chamberlain in the chair.

The roll was called and the following were present: President Chamberlain, Treasurer Dean, Messrs. Rising, Hanford, Ball, Lessiter, Cobb, Sharp, Hyde, Reed, Gard, Burrington, Shoemaker, J. P., Angel, Howard, Young, Butterfield, Gilbert, Anderson, Wells, Baxter, Humphrey, Phillips. Fralick, Parsons, and the Secretary.

The report of the Horticultural Department was presented and accepted.

The Committee on Premiums offered the following:

To the President and Executive Committee of the Michigan State Agricultural Society:

Your Committee on Premium List, to whom was referred the revision of the list and the recommendations of the President and Executive Superintendents, have had the same under consideration and submit the accompanying report.

It may be proper to state, in presenting this report, that the committee in revising the list have kept in view a slight decrease of moneys offered, at the same time diversifying rather than restricting or impairing the list.

It is also proper to state that the committee are unanimous in making this report with the exception of that part striking out competition open to the world, which was adopted by a majority vote.

I. H. BUTTERFIELD.
C. W. YOUNG.
HENRY FRALICK.
J. P. SHOEMAKER.

Mr. Hanford moved that the report be taken up and passed upon section by section.

Carried.

Mr. Gilbert moved to adopt the report relative to Division A, excepting that part restricting the entries to Michigan cattle only.

It was then moved and supported that the balance of the report referring to

Departments of Live Stock and Poultry, excepting the recommendation to strike out the words "open to the world" be taken up.

The report of the committee relating to Division F was, on motion, adopted.

Mr. Gilbert moved to strike out so much of the report as refers to freight rates of Division O.

Carried.

Moved to adopt the balance of the report.

Carried.

Mr. Gilbert moved to adopt that part of the report recommending the striking out of the words "open to the world."

Mr. Gilbert then offered an amendment, which was lost.

A yea and nay vote was then taken on Mr. Gilbert's motion, and the motion adopted by the following vote:

Yeas—Messrs. Rising, Hanford, Ball, Lessiter, Cobb, Sharp, Hyde, Reed, Gard, Burrington, Shoemaker, J. P., Angel, Butterfield, Wells, Phillips—15.

Nays—President Chamberlain, Treasurer Dean, Messrs. Howard, Young, Gilbert, Baxter, Humphrey, Fralick, Parsons—9.

On motion of Mr. Gilbert it was

Resolved, That all cattle which have been exhibited at any show or Fair outside of Michigan within a year shall be excluded from competition.

The Committee on Rules reported through their Chairman, Mr. Ball, recommending the adoption of last year's rules, with the following changes and additions:

Sec. 8, Article III.—Strike out all relative to messengers.

Article IV., Booths and Shows—Substitute "All persons renting booths or stands or privileges to sell goods or articles on the grounds of the Society shall be entitled to one admission ticket for every two dollars paid for rental."

Strike out Section 1 of Article IX.; substitute for paragraph 1, Sec. 15, Article IX., the following:

Sec. 15. ☞ 1. The printing of complimentary tickets is hereby authorized in such numbers as the President may think advisable for the best management of the Society; regard being had to strict economy. The President shall be the custodian of such tickets, and shall, at the winter meeting of the Society following, report how many were printed and how many were used. Paragraph 1 to be paragraph 2; paragraph 2 changed to paragraph 3; and the following added to paragraph 3. "The President shall be the custodian of these tickets, and shall keep an accurate account of all such tickets given out, and to whom."

Substitute for paragraph 4. "A separate gate shall be located near the main entrance to the grounds, at which gate all attendants' tickets must be presented to be of value; such tickets being of no value at any other gate except tickets for teams with supplies.

"The color of attendants' tickets for gentlemen must be yellow, and if presented by a lady, will not be accepted at any gate. The color of attendants' tickets for ladies must be red, and if presented by any gentleman, will not be accepted at any gate."

On special rules on cattle, strike out the words, "Competition open to the world."

The committee also recommended the appointment of one Superintendent to allot all space to exhibitors in Divisions F, G, H, K, ,L M, N, O, P, Q.

After some discussion, Mr. Ball moved that the recommendation be not concurred in.

Carried.

The report of the Committee on Rules was then on motion adopted as amended.

Mr. Dean moved that the next annual Fair commence on Monday, September 20, to continue five days.

Carried.

The committee on that part of the President's address relative to permanent location, reported as follows:

To the President and Executive Committee of the Michigan State Agricultural Society:

The committee to whom was referred the subject of location of the Fairs of this Society, respectfully report in brief that, believing that after having pursued the migratory plan, so long as the necessity exists prominently, as an educator, from the fact of so many excellent societies existing in all the more improved parts of the State; and that by the moving system so much money is expended for building, and the amount received for them being so small that it does not seem good financial policy to continue the migratory plan; therefore,

Resolved, That measures be immediately taken by the Michigan State Agricultural Society to secure a permanent location for holding its annual Fairs.

WILLIAM BALL.
PHILO PARSONS.
A. J. DEAN.
FRANKLIN WELLS.
A. O. HYDE.

Accepted and adopted.

Mr. Butterfield moved that the following rule be added relative to Class 37:

"That no competitor or gardener shall make more than one entry for the same premium."

Mr. Anderson moved that a committee of three on permanent location be appointed.

Mr. Dean moved to amend by adding the President to the committee.

After a lengthy discussion, in which most of the members participated, Mr. Ball offered as a substitute, that "A committee of five on permanent location be appinted, the President to be one of the number."

Carried.

Mr. Dean moved to reconsider the vote fixing the dates of the annual Fair. The motion prevailed.

On motion of Mr. Dean, the resolution was then tabled until morning.

The following communication was received from Mr. Cobb:

To the President and Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN—I desire at this time to tender my resignation as a member of this Board, and ask that it be accepted, and that I shall be discharged from further duty.

Respectfully,

W. H. COBB.

Detroit, January 13, 1886.

On motion of Mr. Hyde, Mr. Cobb's resignation was laid upon the table.

The committee then adjourned to meet on Thursday morning at 9 o'clock.

FOURTH DAY.

RUSSELL HOUSE,
DETROIT, January 14, 1886.

The Executive Committee met pursuant to adjournment; President Chamberlain in the chair.

Roll call: President Chamberlain, Treasurer Dean, Messrs. Rising, Hanford, Ball, Lessiter, Cobb, Sharp, Hyde, Reed, Gard, Burrington, Shoemaker, J. P., Angel, Howard, Young, Butterfield, Gilbert, Anderson, Wells, Baxter, Humphrey, Phillips, Fralick, Parsons, and the Secretary.

Upon motion the approving of minutes was deferred.

Moved and supported to take from the table Mr. Dean's resolution naming date for the next Fair.

The motion prevailed.

Mr. Dean then offered as a substitute that the annual Fair be held commencing September 13, and continuing five days.

Carried.

The following resolution offered by Mr. Butterfield was unanimously adopted:

Resolved, That the thanks of this committee are due and are hereby extended to Mr. C. J. Whitney and Prof. McKnight for the very excellent entertainment afforded them by these gentlemen on Tuesday Evening.

Mr. Parsons offered the following:

Resolved, That so far as practical, the various departments comprising the exhibition of the State Agricultural Society be placed in charge of members of the Executive Committee of said Society.

Adopted.

Mr. Fralick moved to reconsider the vote adopting Mr. Parsons' resolution.

Lost.

On motion of Mr. Gilbert, it was:

Resolved, That the Committee on Permanent Location be instructed to take such steps as they may deem necessary to ascertain what propositions, if any, toward such permanent location can be obtained. And if in their judgment, sufficient inducements are offered to warrant them in calling a meeting of the Executive Committee, that they do so; if not, to notify the Locating Committee in time for them to locate the next annual Fair.

The President announced as Committee on Permanent Location, Messrs. E. O. Humphrey, Henry Fralick, Michael Shoemaker and W. L. Webber. (President Chamberlain, a member by resolution creating the Committee.)

Mr. Fralick asked to be excused from serving on the Committee, giving reasons, etc.

On motion, Mr. Fralick was excused, and Mr. Wm. Ball appointed in his stead.

Mr. Gilbert moved that the Business Committee, President, Secretary, Treasurer and Chairman of the Transportation Committee be appointed a Committee on Location.

Carried.

Mr. Butterfield moved that 500 catalogues of entries in Divisions A, B, C, D, E, and I, be printed and offered for sale during the Fair at 10 cents each.

Moved by Mr. Young to omit Division I.

The motion, as amended, carried.

Mr. Phillips moved to reconsider the vote.

Carried.

On motion of Mr. Hanford the motion authorizing the publishing of catalogues was tabled.

Moved and supported to reconsider the vote adopting the report of the Committee on Premiums.

The motion was lost.

The President announced the following standing Committees:

Business Committee—Messrs. Hyde, Sharp, Hanford.
Transportation Committee—Messrs. Cobb, Turner, Gilbert.

The Committee then voted a recess of 30 minutes.

Committee resumed business.

Mr. Lessiter moved to take Mr. Cobb's resignation from the table.

Carried.

Moved and supported that the resignation be accepted.

A rising vote was taken and the motion lost, every member present voting no.

Upon motion of Mr. Gilbert, the President and Treasurer were appointed a committee to prepare a testimonial for Mr. Cobb, for valuable services rendered.

The Committee on Presidents Address, relating to the Horticultural Society, reported as follows:

To the President and Executive Committee of the Michigan State Agricultural Society:

Your Committee, to whom was referred so much of the President's address as related to the Horticultural Society, would respectfully report that they have conferred with a like committee from the Horticultural Society, and would recommend that said Society be invited to exhibit with us at the State Fair of 1886, and that the Treasurer of this Society be authorized to pay to said Society the sum of $800, for premiums, and $1,200 for expenses, on the same terms and conditions as last year: *Provided,* The said Horticultural Society accept the above invitation within sixty days.

Respectfully submitted,

H. O. HANFORD.
W. H. COBB.
F. L. REED.

Report accepted and adopted.

Moved and supported, that if the proposition is not accepted by the State Horticultural Society, the premium list of that department for 1884 be adopted as the list for this year, and the President appoint a Superintendent for the department.

Carried.

The President announced the following Committees and Superintendents:

EXECUTIVE SUPERINTENDENTS.

Cattle—I. H. Butterfield.
Horses—George W. Phillips.
Sheep—D. W. Howard.
Swine—John Lessiter.
Poultry—J. Q. A. Burrington.
Farm and Garden Products—Amos Wood.
Dairy—J. P. Shoemaker.
Bees, Honey, etc.—M. J. Gard.
Farm Implements—Chas. W. Young, Abel Angel, H. O. Hanford.
Vehicles—F. L. Reed.
Machinery—John Gilbert.
Manufactures—Henry Fralick.
Music, Sewing Machines, etc.—M. P. Anderson.
Art—W. J. Baxter.
Needlework—Philo Parsons.
Miscellaneous—Franklin Wells.
Children's Department—Philo Parsons.
Gates—Wm. Ball.
Police—John C. Sharp.
Forage—E. W. Rising.
Committee on Reception—Philo Parsons, E. O. Humphrey, Wm. L. Webber.
Committee on Programme—G. W. Phillips, I. H. Butterfield, D. W. Howard.
General Superintendent—Wm. Cobb.
Chief Marshal—A. O. Hyde.

Mr. Baxter asked to be excused from serving as Superintendent of Art Department.

Moved and supported that Mr. Baxter be not excused.

The motion prevailed.

The contract with Kalamazoo was read by Mr. Cobb. Mr. Humphrey, appointed to settle with Col. Stockbridge the question of ownership of buildings on the Kalamazoo Fair grounds, reported that he had settled with Col. Stockbridge, and had given him the following named buildings for the $4,000 subscribed, as per contract:

Addition Main Hall, 150x46	$1,080 00
Addition Main Hall, 75x48	540 00
Addition Main Hall, 50x48	360 00
Lunch Room, 16x32	175 00
Ladies' Cottage, 16x48	175 00
Ticket Office	101 25
Press Room	106 97
Carriage House	480 00
125 cattle stalls @ $4	500 00
167 sheep and swine pens @ $3 (s. w. corner grounds)	500 00

Mr. James M. Turner, member elected on Tuesday last, was introduced and took his seat with the Committee.

Mr. Humphrey read a letter from Mayor DeYoe, of Kalamazoo, inviting the Society to hold its next Fair at Kalamazoo.

On motion, the Treasurer was instructed to collect the balance ($100) due on Kalamazoo contract.

On motion, a recess until 2 o'clock was voted.

AFTERNOON SESSION.

Mr. Wells moved that the members of the Transportation Committee, Messrs. Turner and Gilbert, be added to the Committee on Location.

Carried.

Mr. Parsons, Chairman of the Reception Committee, reported as follows:

To the President and Executive Committee of the Michigan State Agricultural Society:

The Committee on Reception are gratified in reporting that the Society had the pleasure of receiving a number of distinguished guests at its annual meeting in Kalamazoo, notably Senator Palmer, Governor Alger, Cyrus G. Luce, the veteran Agriculturist, Charles T. Gorham, and numerous other persons who honored themselves by their presence at this our annual gathering, as well as the Society, and who expressed unqualified gratification in witnessing the magnificent display of the material interests and evidences of prosperity and growing wealth of the great State of Michigan.

PHILO PARSONS,
Chairman.

Accepted and adopted.

On motion of Mr. Parsons the President was authorized to fill vacancies that may occur in the Committee on Permanent Location.

The same gentleman read a letter from the President of the Ohio State Board of Agriculture favoring a permanent location.

On motion the Committee adjourned *sine die.*

WM. CHAMBERLAIN,
President.

J. C. STERLING,
Secretary.

OFFICIAL LIST OF PREMIUMS AWARDED AT THE THIRTY-SEVENTH ANNUAL FAIR OF THE SOCIETY HELD AT KALAMAZOO, SEPTEMBER 14 TO 18, 1885.

DIVISION A—CATTLE.

CLASS 1—SHORTHORNS.

Best bull four years old or over, J. R. Anderson & Son, Anderson, Ohio	$25 00
2d do., H. H. Hinds, Stanton	20 00
3d do., Moore & Sanborn, St. Clair	15 00
4th do., A. F. Wood, Mason	10 00
Best bull three years old, W. E. Boyden, Delhi Mills	20 00
2d do, L. W. & O. Barnes, Byron	15 00
Best bull two years old, E. A. Bissell, Richland	20 00
2d do., D. C. Reed, Kalamazoo	15 00
3d do., O. Snow & Son, Kalamazoo	10 00
4th do., J. M. Turner, Lansing	5 00
Best bull one year old, Jno. Lessiter, Jersey	15 00
2d do., C. F. Moore, St. Clair	10 00
3d do., J. M. Turner, Lansing	5 00
4th do., Moore & Sanborn, St. Clair	3 00
Best bull calf under one year, W. E. Boyden, Delhi Mills	12 00
2d do., J. R. Anderson & Son, Anderson, Ohio	8 00
3d do., C. F. Moore, St. Clair	5 00
4th do., A. F. Wood, Mason	3 00
Best cow four years old or over, J. M. Turner, Lansing	25 00
2d do., J. R. Anderson & Son, Anderson, Ohio	20 00
3d do., W. E. Boyden, Delhi Mills	15 00
4th do., H. H. Hinds, Stanton	10 00
Best cow three years old, G. W. Judson, Schoolcraft	20 00
2d do., O. Snow & Son, Kalamazoo	15 00
3d do., W. E. Boyden, Delhi Mills	10 00
4th do, A. Hosner, North Farmington	5 00
Best heifer two years old, W. E. Boyden, Delhi Mills	20 00
2d do., J. R. Anderson & Son, Anderson, Ohio	15 00
3d do., W. E. Boyden, Delhi Mills	10 00
4th do., C. F. Moore, St. Clair	5 00
Best yearling heifer, G. W. Judson, Schoolcraft	15 00
2d do., C. F. Moore, St. Clair	10 00
3d do., J. R. Anderson & Son, Anderson, Ohio	5 00
4th do., E. A. Bissell, Richland	3 00
Best heifer calf under one year, W. E. Boyden, Delhi Mills	12 00
2d do., H. H. Hinds, Stanton	8 00
3d do., G. W. Judson, Schoolcraft	5 00
4th do., O. Snow & Son, Kalamazoo	3 00
Best herd of Shorthorns, C. F. Moore, St. Clair	40 00
2d do., W. E. Boyden, Delhi Mills	30 00
3d do., H. H. Hinds, Stanton	25 00
4th do., John Lessiter, Jersey	20 00
Best Shorthorn bull and four of his get, sweepstakes, Moore & Sanborn, St. Clair	20 00
2d do., H. H. Hinds, Stanton	12 00
3d do., A. F. Wood, Mason	8 00

FRED P. HILLS, *Judge.*

CLASS 2—DEVONS.

Best bull four years old or over, D. J. Whitmore & Co., Casstown, Ohio	$35 00
2d do., E. T. Doney, Jackson	20 00
3d do., H. W. Calkins, Allegan	15 00

Best bull three years old, Rumsey Bros., Westfield, N. Y.	$20 00
Best bull two years old, Wm. S. Walker, Utica	20 00
2d do., E. T. Doney, Jackson	15 00
3d do., E. D. Craig, Lima, Ind.	10 00
Best bull one year old, W. S. Walker, Utica	15 00
2d do., D. J. Whitmore & Co., Casstown, Ohio	10 00
Best calf under one year, H. W. Calkins, Allegan	12 00
2d do., D. J. Whitmore & Co., Casstown, Ohio	8 00
3d do., Ramsey Bros., Westfield, N. Y.	5 00
Best cow four years old or over, D. J. Whitmore & Co., Casstown, Ohio	25 00
2d do., Wm. S. Walker, Utica	20 00
3d do., H. W. Calkins, Allegan	15 00
Best cow three years old, Wm. S. Walker, Utica	20 00
2d do., Rumsey Bros., Westfield, N. Y.	15 00
3d do., H. W. Calkins, Allegan	10 00
Best heifer two years old, Wm. S. Walker, Utica	20 00
2d do., Wm. S. Walker, Utica	15 00
3d do., H. W. Calkins, Allegan	10 00
Best yearling heifer, D. S. Whitmore & Co., Casstown, Ohio	15 00
2d do., Wm. S. Walker, Utica	10 00
3d do., H. W. Calkins, Allegan	5 00
Best heifer under one year, Wm. S. Walker, Utica	12 00
2d do., D. J. Whitmore & Co., Casstown, Ohio	8 00
3d do., Wm. S. Walker, Utica	3 00
Best herd of Devons, Wm. S. Walker, Utica	40 00
2d do., D. J. Whitmore & Co., Casstown, Ohio	30 00
3d do., Rumsey Bros., Westfield, N. Y.	25 00

WILLIAM WRIGHT,
R. B. CARUSS,
F. H. JOHNSON,
Judges.

CLASS 3—HEREFORDS.

Best bull four years old or over, Wm. Hamilton, Flint	$25 00
2d do., Edwin Phelps, Pontiac	20 00
3d do., Thomas Foster, Flint	15 00
Best bull, 3 years old, Foster & Pearsall, Flint	20 00
2d do., Frank H. Johnson & Co., South Bend, Ind	15 00
Best bull, 2 years old, Wm. Hamilton, Flint	20 00
2d do., Frank H. Johnson & Co., South Bend, Ind	15 00
3d do., Foster & Pearsall, Flint	10 00
Best bull, 1 year old, Thomas Foster, Flint	15 00
2d do., Edwin Phelps, Pontiac	10 00
3d do., Thomas Foster, Flint	5 00
Best bull, under 1 year, Foster & Pearsall, Flint	12 00
2d do., Foster & Pearsall, Flint	8 00
3d do., Wm. Hamilton, Flint	5 00
Best cow, 4 years old or over, Thomas Foster, Flint	25 00
2d do., Wm. Hamilton, Flint	20 00
3d do., Wm. Hamilton, Flint	15 00
Best cow, 3 years old, Frank H. Johnson & Co., South Bend, Ind	20 00
2d do., Frank H. Johnson & Co., South Bend, Ind	15 00
3d do., Foster & Pearsall, Flint	10 00
Best heifer, 2 years old, Foster & Pearsall, Flint	20 00
2d do., Foster & Pearsall, Flint	15 00
3d do., Wm. Hamilton, Flint	10 00
Best yearling heifer, Frank H. Johnson & Co., South Bend, Ind	15 00
2d do., Wm. Hamilton, Flint	10 00
3d do., Thomas Foster, Flint	5 00
Best heifer calf, under one year, Foster & Pearsall, Flint	12 00
2d do., Edwin Phelps, Pontiac	8 00
3d do., Frank H. Johnson & Co., South Bend, Ind	5 00
Best herd of Herefords, Wm. Hamilton, Flint	40 00
2d do., Thomas Foster, Flint	30 00
3d do., Edwin Phelps, Pontiac	25 00

THOMAS CLARK,
Buchu, Ill., *Judge.*

CLASS 4—JERSEYS.

Best bull, 4 years old or over, Frank H. Johnson & Co., South Bend, Ind	$25 00
2d do., H. R. Kingman, Battle Creek	20 00
3d do., H. R. Kingman, Battle Creek	15 00
4th do., John D. Sumner, Kalamazoo	10 00
Best bull, 3 years old, O. J. Bliss, Silver Creek	*20 00*
2d do., G. B. & C. S. Smith, Eagle	15 00
3d do., G. W. & E. O. Dewey, Owosso	10 00
4th do., O. J. Bliss, Silver Creek	5 00
Best bull, 2 years old, H. R. Kingman, Battle Creek	20 00
2d do., J. S. McBride, Burton	15 00
3d do., Frank H. Johnson, South Bend, Ind	10 00
4th do., Harlo G. Carter, Hastings	5 00
Best bull, one year old, Peabody & Watkins, Birmingham	15 00
2d do., G. W. & E. O. Dewey, Owosso	*10 00*
3d do., H. R. Kingman, Battle Creek	5 00
4th do., Frank H. Johnson & Co., South Bend, Ind	3 00
Best bull calf, under 1 year, G. B. & C. S. Smith, Eagle	12 00
2d do., Frank H. Johnson & Co., South Bend, Ind	8 00
3d do., O. J. Bliss, Silver Creek	5 00
4th do., John D. Sumner, Kalamazoo	3 00
Best cow, 4 years old or over, G. B. & C. S. Smith, Eagle	25 00
2d do., H. R. Kingman, Battle Creek	20 00
3d do., G. B & C. S. Smith, Eagle	*15 00*
4th do., H. R. Kingman, Battle Creek	10 00
Best cow, 3 years old, Frank H. Johnson & Co., South Bend, Ind	20 00
2d do., G. B. & C. S. Smith, Eagle	15 00
3d do., Mrs. H. Youell, Grand Rapids	10 00
4th do., O. J. Bliss, Silver Creek	5 00
Best heifer, 2 years old, H. R. Kingman, Battle Creek	20 00
2d do., G. B. & C. S. Smith, Eagle	15 00
3d do., Mrs. H. Youell, Grand Rapids	10 00
4th do., Peabody & Watkins, Birmingham	*5 00*
Best yearling heifer, G. B. & C. S. Smith, Eagle	15 00
2d do., H. R. Kingman, Battle Creek	10 00
3d do., O. J. Bliss, Silver Creek	5 00
4th do., Frank H. Johnson & Co., South Bend, Ind	3 00
Best heifer calf, under 1 year, H. R. Kingman, Battle Creek	12 00
2d do., H. R. Kingman, Battle Creek	8 00
3d do., Mrs. Dr. Sherman, Cooper	5 00
4th do., Peabody & Watkins, Birmingham	3 00
Best herd of Jerseys, Frank H. Johnson & Co., South Bend, Ind	*40 00*
2d do., G. B. & C. S. Smith, Eagle	30 00
3d do., H. R. Kingman, Battle Creek	25 00
4th do., John D. Sumner, Kalamazoo	20 00
Best Jersey bull, and 4 of his get, sweepstakes, G. B. & C. S. Smith, Eagle	20 00
2d do., H. R. Kingman, Battle Creek	12 00
3d do., H. R. Kingman, Battle Creek	8 00

GEORGE JACKSON,
Indianapolis, Ind., *Judge.*

CLASS 5—GALLOWAYS AND POLLED ANGUS.

Best bull, 4 years old or over, R. B. Caruss, St. Johns	$25 00
2d do., R. G. Hart, Lapeer	20 00
Best bull, 3 years old, W. P. Darrow, Jefferson	20 00
Best bull, 2 years old, R. C. Auld, Dexter	20 00
Best bull, 1 year old, R. C. Auld, Dexter	15 00
2d do., Wm. Keith, Pittsford	10 00
Best bull calf, under 1 year, R. C. Auld, Dexter	12 00
2d do., Wm. Keith, Pittsford	8 00
3d do., R. B. Caruss, St. Johns	5 00
Best cow, 4 years old or over, R. C. Auld, Dexter	25 00
2d do., W. P. Darrow, Jefferson	20 00
3d do., Wm. Keith, Pittsford	15 00
Best cow, 3 years old, R. C. Auld, Dexter	20 00
2d do., R. C. Auld, Dexter	15 00
3d do., R. B. Caruss, St. Johns	10 00

Best heifer two years old, R. C. Auld, Dexter	$20 00
2d do., R. B. Caruss, St. Johns	15 00
3d do., R. C. Hart, Lapeer	10 00
Best Yearling heifer, R. C. Auld, Dexter	15 00
2d do., R. C. Auld, Dexter	10 00
3d do., W. P. Darrow, Jefferson	5 00
Best heifer calf under one year, R. B. Caruss, St. Johns	12 00
2d do., R. C. Auld, Dexter	8 00
Best herd of Galloways and Polled Angus, R. C. Auld, Dexter	40 00
2d do., R. B Caruss, St. Johns	30 00
3d do., R. G. Hart, Lapeer	25 00

T. F. SOTHAM,
H. J. BURROWS,
Judges.

CLASS 6—HOLSTEIN-FRIESIANS.

Best bull, four years old or over, H. McNary & Son, West Leroy	$25 00
2d do., Wm. O. Jackson, South Bend, Ind	20 00
3d do., S. H. Angwene, Mendon	15 00
4th do., Will. D. Post, Wasepe	10 00
Best bull three years old, Martin L. Sweet, Grand Rapids	20 00
2d do., Martin L. Sweet, Grand Rapids	15 00
3d do., M. R. Seeley & Co., Farmington	10 00
4th do., J. den Bleyker, Kalamazoo	5 00
Best bull two years old, E. R. Phillips, Bay City	20 00
2d do., W. S. Crosby, Gobleville	15 00
3d do., Stone & Briggs, Hastings	10 00
Best bull one year old, M. R. Seeley & Co., Farmington	15 00
2d do., E. R. Phillips, Bay City	10 00
3d do., Martin L. Sweet, Grand Rapids	5 00
4th do., Stone & Briggs, Hastings	3 00
Best bull calf under one year, Martin L. Sweet, Grand Rapids	12 00
2d do., M. R. Seeley & Co., Farmington	8 00
3d do., Wm. O. Jackson, South Bend, Ind	5 00
4th do., Martin L. Sweet, Grand Rapids	3 00
Best cow four years old or over, Martin L. Sweet, Grand Rapids	25 00
2d do., Martin L. Sweet, Grand Rapids	20 00
3d do., Stone & Briggs, Hastings	15 00
4th do., Wm. O. Jackson, South Bend, Ind	10 00
Best cow three years old, Martin L. Sweet, Grand Rapids	20 00
2d do., Wm. O. Jackson, South Bend, Ind	15 00
3d do., M. R. Seeley & Co., Farmington	10 00
4th do., M. R. Seeley & Co., Farmington	5 00
Best heifer two years old, Wm. O. Jackson, South Bend, Ind	20 00
2d do, Martin L. Sweet, Grand Rapids	15 00
3d do., M. R. Seeley & Co., Farmington	10 00
4th do., J den Bleyker, Kalamazoo	5 00
Best yearling heifer, M. R. Seeley & Co., Farmington	15 00
2d do., Stone & Briggs, Hastings	10 00
3d do, J. den Bleyker, Kalamazoo	5 00
4th do., James Nesbitt, Schoolcraft	3 00
Best heifer calf under one year, Wm. O. Jackson, South Bend, Ind	12 00
2d do., Martin L. Sweet, Grand Rapids	8 00
3d do., Martin L. Sweet, Grand Rapids	5 00
4th do., M. R. Seeley & Co., Farmington	3 00
Best herd of Holstein-Friesians, Martin L. Sweet, Grand Rapids	40 00
2d do., Wm. O. Jackson, South Bend, Ind	30 00
3d do., M. R. Seeley & Co., Farmington	25 00
4th do., Stone & Briggs, Hastings	20 00
Best Holstein-Friesian bull and four of his get, sweepstakes, M. R. Seeley & Co., Farmington	20 00
2d do., Stone & Briggs, Hastings	12 00
3d do., Martin L. Sweet, Grand Rapids	8 00

F. H. JOHNSON,
E. R. PHILLIPS,
JOHN YOUELL,
Judges.

CLASS 7—GRADE CATTLE.

Best grade or native cow four years old or over, W. E. Boyden, Delhi Mills	$25 00
2d do., Thomas Foster, Flint	20 00
3d do., A. Hosner, North Farmington	15 00
Best heifer three years old, O. Snow & Son, Kalamazoo	20 00
2d do., A. Hosner, North Farmington	15 00
3d do., A. Hosner, North Farmington	10 00
Best yearling heifer, E. A. Bissell, Richland	10 00
Best heifer calf, A. Hosner, North Farmington	12 00
2d do., E. A. Bissell, Richland	8 00

R. B. CARUSS,
C. F. MOORE,
GEO. W. JUDSON,
Judges.

CLASS 8—FAT CATTLE.

Best steer three years old and under four, Thomas Foster, Flint	$30 00
2d do., A. Hosner, North Farmington	20 00
3d do., F. A. Townly, Tompkins	10 00
Best steer two years old and under three, Wm. Wright, North Adams	20 00
2d do., A. Hosner, North Farmington	15 00
3d do., Wm. Wright, North Adams	10 00
Best steer one year old and under two, Charles E. Blanchard, Morenci	15 00
2d do., Charles E. Blanchard, Morenci	15 00
3d do., O. Snow & Son, Kalamazoo	5 00
Best cow or heifer three years old or over, W. E. Boyden, Delhi Mills	30 00
2d do., Thomas Foster, Flint	20 00
3d do., John Lessiter, Jersey	10 00
Best herd of five fat cattle under four years, A. Hosner, North Farmington	30 00
2d do., F. A. Townly, Tompkins	20 00
Best steer three years old and under four, showing greatest weight for age in days, F. A. Townly, Tompkins	15 00
Best steer two years old and under three, showing greatest weight for age in days, Richard Conley, Marshall	15 00
Best steer one year old and under two, showing greatest weight for age in days, A. Hosner, North Farmington	15 00

J. F. RUNDEL,
A. G. TAYLOR,
R. C. AULD,
Judges.

GURNSEYS.

Best bull three years old, cow three years old, and heifer calf, John G. Durkee, Birmingham	$20 00

S. M. WRIGHT, Elgin, Ill.,
Judge.

DIVISION B—HORSES.

CLASS 9—CLEVELAND BAYS.

Best stallion four years old or over, Door Prairie Live Stock Association, Door Village, Ind	$30 00
2d do., T. Bangs & Co., Paw Paw	20 00
Best stallion three years old, W. H. Smith & Co., Hillsdale	20 00

R. W. COYKENDALL,
B. F. PROCTOR,
Judges.

CLASS 10—THOROUGHBREDS.

Best stallion four years old or over, W. R. Walker, Athens	$30 00
2d do., Charles Dorsey, Kendall	20 00
Best stallion one year old, J. W. Turner, Matteson	10 00
Best stallion colt, Charles Burnham, Fulton	7 00
Best brood mare four years old or over, with foal by her side, second premium, Charles Burnham	15 00

Best brood mare four years old or over, without colt, E. Harwood, Leslie $15 00
2d do., John W. Turner, Matteson 12 00

J. W. PARKHURST,
JAMES DAVIDSON,
Judges.

CLASS 11—HORSES OF ALL WORK.

Best stallion four years old or over, J. Guy, Nashville $25 00
2d do., M. V. Wagner, Marshall 20 00
3d do., E. J. Carter, Schoolcraft 15 00
Best stallion three years old, M. Cook, Otsego 20 00
2d do., A. S. Perrin, Parkville 15 00
3d do., Nelson T. Parker, Hastings 10 00
Best stallion, two years old, Door Prairie Live Stock Association, Door Village, Ind 12 00
2d do., A. S. Perrin, Parkville 10 00
3d do., A. G. Fellows, Schoolcraft 8 00
Best stallion one year old, Samuel S. Butter, Matteson 10 00
2d do., Samuel Douglass, Texas 8 00
Best stallion colt, M. V. Wagner, Marshall 8 00
Best brood mare four years old or over, with foal by her side, George W. Judson, Schoolcraft 20 00
2d do., Daniel McGregor, Kendall 15 00
3d do., M. V. Wagner, Marshall 10 00
Best mare four years old or over, without colt, M. V. Wagner, Marshall 12 00
2d do., W. R. Walker, Athens 8 00
Best mare three years old, A. S. Perrin, Parkville 10 00
Best mare two years old, D. R. Stuart, Schoolcraft 8 00
2d do., Thomas Maxwell, Stanton 5 00
Best mare one year old, A. N. Millspaugh, Richland 7 00
2d do., Thomas Maxwell, Stanton 5 00
3d do., W. U. W. Adams, Jackson .....
Best filly colt, Daniel McGregor, Kendall 5 00
2d do., George W. Judson, Schoolcraft 3 00
Best gelding five years old or over, James R. Deyo, Jackson 15 00
2d do., Samuel S. Butter, Matteson 10 00
Best gelding four years old, James R. Deyo, Jackson 12 00
Best gelding three years old, Knappen Bros. & Co., Richland 10 00
Best gelding two years old, C. S. Rix, Mattawan 8 00
2d do., C. S. Rix, Mattawan 5 00
3d do., Samuel McGregor, Kendall 3 00
Best *matched horses five years old or over, weight of each horse to be not less* than 1,100 pounds, Phineas Farren, Lawton 30 00

R. W. COYKENDALL,
B. F. PROCTOR,
Judges.

CLASS 12—ROADSTERS.

Best stallion, five years old or over, S. A. Brown & Co., Kalamazoo $30 00
2d do., H. S. Wixon, Union City 20 00
3d do., S. A. Browne & Co., Kalamazoo 10 00
Best stallion four years old, second premium, F. Messenger, Hillsdale 15 00
3d do., T. C. Ives, Coldwater 10 00
Best stallion three years old, S. A. Browne & Co., Kalamazoo 20 00
2d do., Ray Warner, Coldwater 15 00
3d do., S. A. Browne & Co., Kalamazoo 10 00
Best gelding five years old or over, Ray Warner, Coldwater 15 00
2d do., H. F. Badger, Kalamazoo 10 00
Best gelding four years old, James R. Deyo, Jackson 12 00
Best gelding, three years old, Samuel Cross, Centreville 10 00
2d do., H. M. Williams, Mason 6 00
Best mare four years old and over, without colt. Abram S. Smith, Girard 12 00

WM. S. WILCOX,
JAMES DAVIDSON,
Judges.

CLASS 13—BREEDERS'S STOCK.

Best stallion two years old, Wm. H. Schantz, Hastings	$12 00
2d do., Jacob B. Peters, Colon	8 00
3d do., D. Adams. Reed City	5 00
Best stallion one year old, F. Messenger, Hillsdale	10 00
2d do., F. Messenger, Hillsdale	6 00
Best stallion colt, S. A. Browne & Co., Kalamazoo	7 00
2d do., S. A. Browne & Co., Kalamazoo	5 00
3d do., J. Garman, Parkville	3 00
Best gelding two years old, Daniel Shea, Kalamazoo	8 00
Best brood mare four years old or over, with foal by her side, S. A. Browne & Co., Kalamazoo	20 00
2d do., S. A. Browne & Co., Kalamazoo	15 00
3d do., S. A. Browne & Co., Kalamazoo	10 00
Best mare two years old, S. A. Browne & Co., Kalamazoo	8 00
2d do., S. A. Browne, Kalamazoo	5 00
3d do., H. S. Wixon, Union City	3 00
Best mare one year old, S. A. Browne & Co., Kalamazoo	7 00
2d do., S. A. Browne & Co., Kalamazoo	5 00
3d do., S. A. Browne & Co., Kalamazoo	3 00
Best mare colt, S. A. Browne & Co., Kalamazoo	5 00
2d do., S. A. Browne & Co., Kalamozoo	3 00
3d do., M. V. Wagner, Marshall	2 00

R. W. COYKENDALL,
B. F. PROCTOR,
Judges.

CLASS 14—GENTS' DRIVING HORSES TO ROAD WAGON.

Best pair of driving horses not kept for sporting purposes, James C. Deyo, Jackson	$30 00
2d do., William Fogg, Jonesville	20 00
3d do., D. C. Reed, Kalamazoo	10 00
Best single mare or gelding five years old or over, W. N. Adams, Jackson	30 00
2d do., Charles Clement, Colon	20 00
3d do., S. A. Brown & Co., Kalamazoo	10 00
Best single gelding or mare four years old, A. J. Barber, Mason	20 00
2d do., Frank Dentler, Parkville	15 00

WM. S. WILCOX,
JAMES DAVIDSON,
Judges.

CLASS 15—CLYDESDALE AND ENGLISH DRAFT HORSES.

Best stallion four years old or over, James M. Turner, Lansing	$30 00
2d do., James Burnett, Battle Creek	20 00
3d do., L. G. Bragg, Kalamazoo	10 00
Best stallion three years old, Eli T. Konkey, Woods Corners	20 00
2d do., Door Prairie Live Stock Association, Door Village, Ind	12 00
Best stallion two years old, Door Prairie Live Stock Association, Door Village.	10 00
2d do., Door Prairie Live Stock Association	6 00
Best stallion one year old, Door Prairie Live Stock Association, Door Village	8 00
Best stallion colt, L. G. Bragg, Kalamazoo	5 00
Best mare four years old or over, James M. Turner, Lansing	20 00
2d do., James M. Turner, Lansing	12 00
3d do., James M. Turner, Lansing	8 00
Best mare or gelding two years old, L. G. Bragg, Kalamazoo	10 00
2d do., L. G. Bragg, Kalamazoo	8 00
Best filly colt, James M. Turner, Lansing	5 00
2d do., L. G. Bragg, Kalamazoo	3 00

R. W. COYKENDALL,
B. F. PROCTOR,
Judges.

CLASS 16—NORMAN, PERCHERON AND FRENCH DRAFT HORSES.

Best stallion four years old or over, Savage & Farnum, Detroit	$30 00
2d do., Savage & Farnum, Detroit	20 00
3d do., W. H. Smith & Bros., Hillsdale	10 00

In this class were two stallions exhibited by Geo. McGarvin, from Chatham, Canada, worthy of mention, very fine horses, too late for entry.

Best stallion three years old, Savage & Farnum, Detroit	$20 00
2d do., Savage & Farnum, Detroit	12 00
3d do., Savage & Farnum, Detroit	8 00
Best stallion two years old, John Schipper, Oversee	10 00
Best mare four years old or over, Savage & Farnum, Detroit	20 00
2d do., Savage & Farnum, Detroit	12 00
Best mare three years old, Savage & Farnum, Detroit	12 00
Best mare or gelding two years old, Savage & Farnum, Detroit	10 00
2d do., Savage & Farnum, Detroit	6 00
Best mare or gelding one year old, Savage and Farnum, Detroit	8 00
2d do., Savage & Farnum, Detroit	5 00

R. W. COYKENDALL,
B. F. PROCTOR,
Judges.

CLASS 17—DRAFT HORSES.

Best mare four years old or over, J. M. Turner, Lansing	$20 00
2d do., Riverside Truck Co., Detroit	12 00
Best mare or gelding two years old, W. D. Smith, Kalamazoo	10 00
2d do., W. D. Smith, Kalamazoo	6 00

JAMES DAVIDSON,
GEO. W. PHILLIPS, JR.,
Judges.

CLASS 18—CARRIAGE AND BUGGY HORSES, GELDING OR MARE.

Best pair of matched horses sixteen hands or over, five years old or over, F. B. Stockbridge, Kalamazoo	$30 00
Best pair matched horses under sixteen hands, four years old, E. H. Van Dusen, Kalamazoo	25 00
2d do., Anson Pase, Homer	15 00
3d do., John den Bleyker, Kalamazoo	10 00
Best pair of matched horses, three years old, D. C. Smith, Oshtemo	20 00
2d do., A. S. Perrine, Parkville	12 00
Best single carriage or buggy horse four years old or over, James C. Deyo, Jackson	12 00
2d do., M. V. Wagner, Marshall	8 00
3d do., John Campbell, Williams	4 00
Best single carriage or buggy horse or mare three years old, James C. Deyo, Jackson	10 00
2d do., Daniel Shea, Kalamazoo	7 00
3d do., W. S. Peacock, Leslie	3 00

JAMES DAVIDSON,
WM. S. WILCOX,
Judges.

CLASS 19—MICHIGAN HORSES, ROADSTER STALLIONS.

Best stallion five years old or over, A. S. Perrine, Parkville	$100 00
3d do., G. C. McAllister, Plainwell	50 00
Best stallion four years old, Farrell & Godfrey, Parma	75 00
Best stallion three years old, A. J. Barber, Mason	30 00
2d do., Daniel Shea, Kalamazoo	20 00
3d do., D. J. Haumer, Lowell	10 00
Best stallion two years old, James C. Deyo, Jackson	20 00

J. W. PARKHURST,
JAMES DAVIDSON,
C. E. MORRISON,
Judges.

CLASS 20—MICHIGAN HORSES, STANDARD BRED MARES AND GELDINGS.

Best mare or gelding five years or over, Thos. McGee, Detroit	$100 00
2d do., James C. Deyo, Jackson	75 00
3d do., H. S. Wixon, Union City	50 00
Best mare or gelding four years old, John H. McNames, Marshall	75 00
2d do., N. N. Marantette, Mendon	50 00
3d do., Samuel Cross, Centreville	25 00

Best mare or gelding, three years old, Nixon Bros., Cassopolis	$30 00
2d do., Havens & Clement, Plainwell	20 00
3d do., N. N. Marantette, Mendon	10 00
Best mare or gelding two years old, Ray Warner, Coldwater	20 00

JAMES DAVIDSON,
C. E. MORRISON,
Judges.

CLASS 21—MICHIGAN HORSES, THOROUGHBRED.

Best stallion any age, Olin Ames, Charlotte	$75 00
2d do., E. H. Troutwine, Constantine	50 00
3d do., E. H. Troutwine	25 00
Best mare or gelding any age over three years, Will Fury, Constantine	50 00
2d do., T. S. Millson, Battle Creek	30 00
3d do., B. L. Cristall, Constantine	20 00

JAMES DAVIDSON,
WM. S. WILCOX,
Judges.

CLASS 22—SWEEPSTAKES STALLIONS.

Best thoroughbred stallion with six of his get, W. R. Walker, Athens	$25 00
Best all work stallion with six of his get, John Sutton, Kalamazoo	25 00
2d do., Herman Miller, Lawton	20 00
Best roadster stallion with six of his get, S. A. Browne & Co., Kalamazoo	25 00
2d do., H. F. Badger, Kalamazoo	20 00

R. W. COYKENDALL,
B. F. PROCTOR,
Judges.

DIVISION C—SHEEP.

CLASS 23—THOROUGHBRED AMERICAN MERINOS.

Best ram three years old or over, L. C. Nelson, Olivet	$20 00
2d do., F. C. Wood, Saline	15 00
3d do., L. W. & O. Barnes, Byron	10 00
Best ram two years old, A. T. Short, Coldwater	20 00
2d do., C. Hibbard & Son, Bennington	15 00
3d do., A. A. Wood, Saline	10 00
Best ram one year old, A. T. Short, Coldwater	15 00
2d do., L. W. & O. Barnes, Byron	12 00
3d do., F. C. Wood, Saline	8 00
Best ram lamb, A. A. Wood, Saline	12 00
2d do., L. W. & O. Barnes, Byron	10 00
3d do., F. C. Wood, Saline	5 00
Best pen ewes three years old or over, A. A. Wood, Saline	20 00
2d do., L. W. & O. Barnes, Byron	15 00
3d do., H. L. Doane, South Lyon	10 00
Best pen ewes two years old, F. C. Wood, Saline	20 00
2d do., F. C. Wood, Saline	15 00
3d do., H. L. Doane, South Lyon	10 00
Best pen ewes one year old, F. C. Wood, Saline	15 00
2d do., H. L. Doane, South Lyon	12 00
3d do., L. W. & O. Barnes, Byron	8 00
Best pen ewe lambs, A. A. Wood, Saline	12 00
2d do., L. W. & O. Barnes, Byron	10 00
3d do., H. L. Doane, South Lyon	5 00

CHAS. E. SOUTHWELL,
E. B. WELGH,
A. K. WARREN,
Judges.

CLASS 24—THOROUGHBRED AMERICAN MERINOS, BRED AND OWNED IN MICHIGAN.

Best ram two years old or over, L. W. & O. Barnes, Byron	$20 00
2d do., A. A. Wood, Saline	15 00
3d do., A. T. Short, Coldwater	10 00

Best ram one year old, A. T. Short, Coldwater	$15 00
2d do., A. A. Wood, Saline	12 00
3d do., L. W. & O. Barnes, Byron	8 00
Best ram lamb, A. A. Wood, Saline	12 00
2d do., F. C. Wood, Saline	10 00
3d do., H. L. Doane, Soutb Lyon	5 00
Best pen ewes two years old or over, A. T. Short, Coldwater	20 00
2d do., H. L. Doane, South Lyon	15 00
3d do., F. C. Wood, Saline	10 00
Best pen ewes one year old, A. A. Wood, Saline	15 00
2d do., F. C. Wood, Saline	12 00
3d do., A. T. Short, Coldwater	8 00
Best pen ewe lambs, A. A. Wood, Saline	12 00
2d do., L. C. Nelson, Olivet	10 00
3d do., F. C. Wood, Saline	5 00

S. B. HAMMOND,
E. B. WELCH,
E. A. DALEY,
Judges.

CLASS 25—FINE WOOL GRADES.

Best pen ewes three years old or over, L. W. & O. Barnes	$15 00
2d do., Nelson Brewer, Grand Rapids	10 00
3d do., Nelson Brewer, Grand Rapids	5 00
Best pen ewes two years old, L. W. & O. Barnes, Byron	12 00
2d do., L. W. & O. Barnes, Byron	8 00
3d do., Nelson Brewer, Grand Rapids	5 00
Best pen ewes one year old, Nelson Brewer, Grand Rapids	10 00
2d do., Nelson Brewer, Grand Rapids	6 00
3d do., G. W. Inman, Saline	4 00
Best pen ewe lambs, Nelson Brewer, Grand Rapids	8 00
2d do., Nelson Brewer, Grand Rapids	5 00
3d do., L. W. & O. Barnes, Byron	3 00

S. B. HAMMOND,
E. A. DALEY,
E. B. WELCH,
Judges.

CLASS 26—SOUTHDOWNS.

Best ram two years old or over, W. D. & L. C. Anderson, Anderson	$15 00
2d do., J. F. Rundell, Birmingham	10 00
3d do., Mrs. Ann Newton, Pontiac	6 00
Best ram one year old, W. D. & L. C. Anderson, Anderson	12 00
Best ram lamb, W. B. Mason, Marshall	10 00
2d do., W. D. & L. C. Anderson, Anderson	6 00
3d do., J. F. Rundel, Birmingham	4 00
Best pen ewes two years old or over, W. D. & L. C. Anderson, Anderson	15 00
2d do., John Lessiter, Jersey	10 00
3d do., J. F. Rundel, Birmingham	6 00
Best pen ewes one year old, W. D. & L. C. Anderson, Anderson	12 00
2d do., John Lessiter, Jersey	10 00
Best pen ewe lambs, John Lessiter	8 00
2d do., W. D. & L. C. Anderson	6 00
3d do., J. F. Rundel, Birmingham	4 00

GEORGE D. BOYCE,
W. B. MASON,
Judges.

CLASS 27—MIDDLE WOOL SHEEP (EXCEPT SOUTHDOWNS).

Best ram two years old or over, J. F. Rundel, Birmingham	$15 00
2d do., John Lessiter, Jersey	10 00
3d do., Aaron Bordwell, Corfu, N. Y	6 00
Best ram one year old, J. F. Rundel, Birmingham	12 00
2d do., Gavin Longmuir, Pontiac	8 00
3d do., Aaron Bordwell, Corfu, N. Y	5 00
Best ram lamb, J. F. Rundel, Birmingham	10 00
2d do., Mrs. Ann Newton, Pontiac	6 00
3d do., Aaron Bordwell, Corfu, N. Y	4 00

Best pen ewes two years old or over, J. F. Rundel, Birmingham	$15 00
2d do., Mrs. Ann Newton, Pontiac	10 00
3d do., Richard Conley, Marshall	6 00
Best pen ewes one year old, J. F. Rundel, Birmingham	12 00
2 do., Aaron Bordwell, Corfu, N. Y	8 00
3 do., Mrs. Ann Newton, Pontiac	5 00
Best pen ewe lambs, Aaron Bordwell, Corfu, N. Y	10 00
2d do., J. F. Rundel, Birmingham	6 00
3d do., Mrs. Ann Newton	4 00

GEORGE D. BOYCE,
W. B. MASON.
Judges.

CLASS 28—MIDDLE WOOL SHEEP, MICHIGAN BRED AND OWNED.

Best ram two years old or over, Richard Conley, Marshall	$15 00
2d do., Mrs. Ann Newton	10 00
3d do., John Lessiter, Jersey	6 00
Best ram one year old, Mrs. Ann Newton	12 00
2d do., Richard Conley	8 00
3d do., J. F. Rundel	5 00
Best ram lamb, John Lessiter	10 00
2d do., J. F. Rundel	6 00
3d do., Gavin Langmuir, Pontiac	4 00
Best pen ewes two years old or over, J. Lessiter	15 00
2d do., J. F. Rundel	10 00
3d do., Richard Conley	6 00
Best pen ewes one year old, J. F. Rundel	12 00
2d do., John Lessiter	8 00
3d do., R. Conley	5 00
Best pen ewe lambs, G. Longmuir	10 00
2d do., J. Lessiter	6 00
3d do., J. F. Rundel,	4 00

GEORGE D. BOYCE,
W. B. MASON,
Judges.

CLASS 29—LEICESTERS.

Best ram two years old or over, A. F. Wood, Mason	$15 00
2d do., A. F. Wood	10 00
Best ram one year old, Mrs. Ann Newton,	12 00
2d do., A. F. Wood	8 00
3d do., A. F. Wood	5 00
Best ram lamb, Mrs. Ann Newton	10 00
2d do., A. F. Wood	6 00
3d do., A. F. Wood	4 00
Best pen ewes two years old or over, A. F. Wood	15 00
2d do., Mrs. Ann Newton	10 00
3d do., A. F. Wood	6 00
Best pen ewes one year old, A. F. Wood	12 00
2d do., A. F. Wood	8 00
Best pen ewe lambs, Mrs. Ann Newton	10 00
2d do., A. F. Wood	8 00
3d do., A. F. Wood	4 00

GEORGE D. BOYCE,
W. B. MASON,
Judges.

CLASS 30—COTSWOLD AND OTHER LONG WOOLED SHEEP.

Best ram two years old or over, Mrs. Ann Newton	$15 00
2d do., Montgomery & Westfall, Hillsdale	10 00
Best ram one year old, Aaron Bordwell	12 00
2d do., Montgomery & Westfall	8 00
Best ram lamb, Montgomery & Westfall	10 00
2d do., Mrs. Ann Newton	6 00
3d do., Montgomery & Westfall	4 00

Best pen of ewes two years old or over, Montgomery & Westfall	$15 00
2d do., Montgomery & Westfall	10 00
3d do., Aaron Bordwell	6 00
Best pen of ewes one year old, Montgomery & Westfall	12 00
2d do., Mrs. Ann Newton	8 00
3d do., Aaron Bordwell	5 00
Best pen of ewe lambs, Aaron Bordwell	10 00
2d do., Montgomery & Westfall	6 00

W. B. MASON,
GEO. D. BOYCE,
Judges.

CLASS 31—GRADE COARSE WOOLED EWES.

Best pen of ewes two years old or over, Mrs. Ann Newton	$12 00
2d do., Aaron Bordwell	8 00
3d do., Richard Conley, Marshall	5 00
Best pen ewes one year old, Richard Conley	10 00
2d do., J. F. Rundel, Birmingham	6 00
Best pen ewe lambs, Mrs. Ann Newton	8 00
2d do., J. F. Rundel	5 00
3d do., Montgomery & Westfall	3 00

W. B. MASON,
GEO. D. BOYCE,
Judges.

CLASS 32—FAT SHEEP.

Best pen of middle wooled sheep, two years old and under three, Gavin Longmuir, Pontiac	$10 00
2d do, John Lessiter, Jersey	8 00
3d do., Mrs. Ann Newton	5 00
Best pen of middle wooled sheep, one year old and under two, Mrs. Ann Newton	10 00
2d do., G. Longmuir, Pontiac	8 00
3d do., R. Conley	5 00
Best pen of long wooled sheep two years old and under three, Montgomery & Westfall	10 00
2d do., Montgomery & Westfall	8 00
Best pen of long wooled sheep one year old and under two, Mrs. Ann Newton	10 00
Best grade sheep two year old and under three, J. F. Rundel, Birmingham	10 00
2d do., J. F. Rundel	8 00
3d do., J. F. Rundel	5 00
Best pen of grade sheep one year old and under two, J. F. Rundell, Birmingham	10 00
2d do., John Lessiter, Jersey	8 00

W. B. MASON,
GEO. D. BOYCE,
Judges.

DIVISION D—SWINE.

CLASS 33—BERKSHIRES.

Best boar one year old, Hibbard & Son, Bennington	$10 00
Best boar under one year old, Hibbard & Son	8 00
Best brood sow two years or over, Hibbard & Son	12 00
Best sow one year old, Hibbard & Son	10 00
Best sow under one year old, Hibbard & Son	8 00
Best pen pigs not less than four, nor more than six months old, Hibbard & Son	8 00

GEO. D. BOYCE,
Judge.

ESSEX.

Best boar two years old, E. T. Doney, Jackson	$12 00
Best boar one year old, E. T. Doney	10 00
2d do., A. F. Wood, Mason	6 00
Best boar under one year old, E. T. Doney	8 00
2d do., A. F. Wood	5 00

Best brood sow two years old or over, E. T. Doney	$12 00
2d do., A. F. Wood	8 00
Best sow one year old, E. T. Doney, Jackson	10 00
2d do., A. F. Wood	6 00
Best sow under one year old, A. F. Wood	8 00
2d do., E. T. Doney	5 00
3d do., E. T. Doney	3 00
Best pen pigs under six months old, A. F. Wood	8 00
2d do., E. T. Doney	5 00
3d do., A. F. Wood	3 00

GEO. D. BOYCE,
Judge.

POLAND CHINAS.

Best boar two years or over, B. G. Buell, Little Prairie Ronde	$12 00
2d do., H. M. Morse, Union City	8 00
3d do., L. W. & O. Barnes, Byron	4 00
Best boar one year old, L. W. & O. Barnes, Byron	10 00
2d do., T. F. Harrington, Paw Paw	6 00
3d do., B. G. Buell, Little Prairie Ronde	3 00
Best boar under one year, G. F. Harrington, Paw Paw	8 00
2d do., G. W. Inman, Saline	5 00
3d do., Fayette M. Dean, Pewamo	3 00
Best brood sow two years old or over, B. G. Buell	12 00
2d do., L. W. & O. Barnes	8 00
3d do., F. M. Dean	4 00
Best sow one year old, L. W. & O. Barnes	10 00
2d do., B. G. Buell	6 00
3d do., G. F. Harrington	3 00
Best sow under one year old, G. F. Harrington	8 00
2d do., F. M. Dean, Pewamo	5 00
3d do., H. M. Morse, Union City	3 00
Best pen of pigs under six months old, H. M. Morse	8 00
2d do., G. F. Harrington	5 00
3d do., L. W. & O. Barnes	3 00

Best boar of any age, H. M. Morse, diploma.

GEORGE D. BOYCE,
Judge.

CHESTER WHITES AND LARGE YORKSHIRES.

Best boar two years old or over, C. A. Searing, Lyons	$12 00
2d do., Joseph Lindsay, Otsego	8 00
Best boar one year old, Joseph Lindsay	10 00
Best boar under one year old, Joseph Lindsay	8 00
2d do., C. A. Searing	5 00
3d do., C. A. Searing	3 00
Best brood sow two years old or over, C. A. Searing	12 00
2d do., Joseph Lindsay	8 00
3d do., Joseph Lindsay	4 00
Best sow one year old, Joseph Lindsay	10 00
2d do., C. A. Searing	6 00
3d do., Joseph Lindsay	3 00
Best sow under one year, Joseph Lindsay	8 00
2d do., C. A. Searing	5 00
3d do., Joseph Lindsay	3 00
Best pen of pigs under six months old, Joseph Lindsay	8 00
2d do., Joseph Lindsay	5 00
3d do., C. A. Searing	3 00

Best boar of any age, C. A. Searing, diploma.

GEORGE D. BOYCE,
Judge.

DUROC OR JERSEY RED.

Best boar one year old, second premium, J. S. McBride, Burton	$ 6 00
Best sow one year old, J. S. McBride	10 00
Best pen of pigs two months old, J. S. McBride	8 00

GEO. D. BOYCE,
Judge.

FAT HOGS, BARROW OR SOW OVER ONE YEAR.

Best barrow hog over one year old, E. T. Doney, Jackson	$10 00
2d do., Roland Fairchild, Kalamazoo	6 00

GEO. D. BOYCE,
Judge.

DIVISION E—POULTRY.

ASIATIC CLASS.

Best collection of Asiatic fowls and chicks, James Ball, Marshall	$10 00
2d do., H. F. Ford & Co., Hastings	5 00
Best pair Light Brahma fowls, Joseph Lindsay, Otsego	2 00
2d do., H. F. Ford & Co., Hastings	1 00
Best pair Light Brahma chicks, Joseph Lindsay, Otsego	2 00
2d do., Z. A. Hartsuff, Unadilla	1 00
Best pair dark Brahma fowls, James Ball, Marshall	2 00
2d do., H. F. Ford & Co., Hastings	1 00
Best pair Dark Brahma chicks, James Ball	2 00
2d do., H. F. Ford & Co., Hastings	1 00
Best pair Buff Cochin fowls, James Ball	2 00
2d do., H. F. Ford & Co	1 00
Best pair Buff Cochin chicks, H. F. Ford & Co	2 00
2d do., H. F. Ford & Co	1 00
Best pair Partridge Cochin fowls, James Ball	2 00
2d do., James Ball	1 00
Best pair Partridge Cochin chicks, James Ball	2 00
2d do., James Ball	1 00
Best pair White Cochin fowls, James Ball	2 00
2d do., H. F. Ford & Co	1 00
Best pair White Cochin chicks, James Ball	2 00
2d do., James Ball	1 00
Best pair Black Cochin fowls, James Ball	2 00
2d do., H. F. Ford & Co	1 00
Best pair Black Cochin chicks, James Ball	2 00
2d do., James Ball	1 00
Best pair Langshan chicks, James Ball	2 00

AMERICAN CLASS.

Best pair Plymouth Rock fowls, C. L. Hogue, Battle Creek	2 00
2d do., Z. A. Hartsuff, Unadilla	1 00
Best pair Plymouth Rock chicks, C. L. Hogue	2 00
2d do., C. L. Hogue	1 00
Best pair Wyandotte fowls, C. L. Hogue	2 00
2d do., James Ball	1 00
Best pair Wyandotte chicks, James Ball	2 00
2d do., James Ball	1 00

BANTAM CLASS.

Best pair black breasted red game bantam fowls, D. R. McElwain & Co., Hastings	$2 00
2d do., Z. A. Hartsuff, Unadilla	1 00
Best pair black breasted red game bantam chicks, Charles N. Ranson, Bangor	2 00
2d do., J. M. Bauer, Hastings	1 00
Best pair duck-wing game bantam fowls, D. R. McElwain & Co	2 00
2d do., D. R. McElwain & Co	1 00
Best pair duck-wing game bantam chicks, D. R. McElwain & Co	2 00
2d do., D. R. McElwain & Co	1 00
Best pair white bantam fowls, D. R. McElwain & Co	2 00
2d do., D. R. McElwain & Co	1 00
Best pair white bantam chicks, Z. A. Hartsuff	2 00
Best pair golden-laced Seabright bantam fowls, Z. A. Hartsuff	2 00

DORKING CLASS.

Best pair colored Dorking fowls, James Ball	2 00
Best pair Dominique fowls, M. H. Walworth, Hillsdale	2 00
Best pair Dominique chicks, M. H. Walworth	2 00
2d do., D. R. McElwain & Co., Hastings	1 00

HOUDAN CLASS.

Best pair Houdan fowls, Z. A. Hartsuff	$2 00
2d do., D. R. McElwain & Co	1 00
Best pair Houdan chicks, D. R. McElwain & Co	2 00

GAME CLASS.

Best pair black-breasted red game fowls, D. R. McElwain & Co	2 00
Best pair black-breasted red game chicks, D. R. McElwain & Co	2 00
Best pair duckwing game fowls, D. R. McElwain & Co	2 00
Best pair duckwing game chicks, D. R. McElwain & Co	2 00

HAMBURG CLASS.

Best pair golden spangled Hamburg fowls, D. R. McElwain & Co	2 00
2d do., D. R. McElwain & Co	1 00
Best pair golden spangled Hamburg chicks, D. R. McElwain & Co., second premium	1 00
Best pair silver spangled Hamburg fowls, M. H. Walworth	2 00
Best pair silver spangled Hamburg chicks, M. H. Walworth	2 00
2d do., M. H. Walworth	1 00
Best pair golden penciled Hamburg fowls, D. R. McElwain & Co	2 00
Best pair golden penciled Hamburg chicks, D. R. McElwain & Co	2 00
Best pair black Hamburg fowls, D. R. McElwain & Co	2 00
2d do., D. R. McElwain & Co	1 00
Best pair black Hamburg chicks, D. R. McElwain & Co	2 00

POLISH CLASS.

Best pair black Polish white crested fowls, Z. A. Hartsuff	2 00
2d do., Joseph Lindsay, Otsego	1 00
Best pair silver Polish fowls, James Ball	2 00
2d do., D. R. McElwain & Co	1 00
Best pair golden Polish fowls, James Ball	2 00
2d do., D. R. McElwain & Co	1 00
Best pair golden Polish chicks, James Ball	2 00
2d do., Joseph Lindsay, Otsego	1 00

SPANISH CLASS.

Best pair black Spanish white-faced fowls, Z. A. Hartsuff	2 00
Best pair black Spanish white-faced chicks, Z. A. Hartsuff	2 00
Best pair white Leghorn single-combed fowls, J. M. Bauer, Hastings, second premium	1 00
Best pair white Leghorn, single-combed chicks, J. M. Bauer	2 00
2d do., Z. A. Hartsuff	1 00
Best pair brown Leghorn single-combed fowls, Chas. L. Hogue	2 00
Best pair brown Leghorn single-combed chicks, C. L. Hogue	2 00
2d do., C. L. Hogue	1 00

DUCK CLASS.

Best pair Muskovy ducks, Z. A. Hartsuff	2 00
Best pair Pekin ducks, James Ball	2 00
2d do., Z. A. Hartsuff	1 00

GOOSE CLASS.

Best pair Toulouse geese, D. R. McElwain & Co	2 00
Best pair Embden geese, James Ball	2 00
Best pair brown Chinese geese, D. R. McElwain & Co	2 00
Best pair white Chinese geese, D. R. McElwain & Co	2 00
2d do., Z. A. Hartsuff	1 00

TURKEY CLASS.

Best pair Bronze turkeys, Joseph Lindsay	2 00
Best pair Slate turkeys, D. R. McElwain & Co	2 00

ORNAMENTAL CLASS.

Best pair Pearl Guinea fowls, Z. A. Hartsuff	2 00

CANARIES.

Best pair German canaries, Z. A. Hartsuff $3 00

STUFFED BIRDS.

Best collection stuffed birds, J. D. Allen, Paw Paw, second premium 5 00

RABBIT CLASS.

Best pair common rabbits, Mieras Marinus, Kalamazoo 2 00

MINOR PET CLASS.

Best pair ferrets, Z. A. Hartsuff 2 00

NON-ENUMERATED.

Best pair white Leghorn rose-combed chicks, J. M. Bauer, Hastings 2 00
Best pair Dominique chicks, Charles W. Rawson, Bangor, second premium 1 00
Best pair Pile game bantam fowls, D. R. McElwain & Co 2 00
Best pair Frizzle chicks, D. R. McElwain & Co 2 00
Best pair rose-combed brown Leghorn chicks, Joseph Lindsay 2 00
2d do., Z. A. Hartsuff 1 00

A. PURCHASE,
Judge.

DIVISION F—FARM AND GARDEN PRODUCTS.

CLASS 35—GRAIN AND SEEDS.

Best bushel winter red wheat, Andrew McClary, Galesburg 6 00
2d do., P. E. Deal, Kalamazoo 4 00
Best bushel winter white wheat, Reuben Barney, Kalamazoo 6 00
2d do., Whipps Bros, Marion, Ohio 4 00
Best bushel spring wheat, Whipps Bros., Marion 5 00
Best bushel of rye, Frank Wilson, Jackson 5 00
2d do., Whipps Bros., Marion 3 00
Best bushel four rowed barley, Whipps Bros., Marion 5 00
Best bushel oats, Whipps Bros.. Marion 5 00
2d do., P. E. Deal, Kalamazoo 3 00
Best bushel dent corn, Whipps Bros., Marion 5 00
2d do., P. E. Deal, Kalamazoo 3 00
Best bushel flint corn, P. E. Deal, Kalamazoo 5 00
2d do., Whipps Bros., Marion 3 00
Best bushel peas, Frank Wilson 5 00
Best bushel white beans, Whipps Bros 5 00
2d do., J. M. Blowers, Lawrence 3 00
Best bushel large clover seed, Whipps Bros 5 00
Best bushel small clover seed, R. M. Cross, Ovid 5 00
2d do., A. L. Rainney, Comstock 3 00
Best bushel timothy seed, Whipps Bros 5 00
2d do., A. L. Rainney, Comstock 3 00
Best bushel buckwheat, Whipps Bros 3 00
2d do., R. M. Cross, Ovid 2 00
Best bushel flax seed, Whipps Bros 3 00
Best bushel red top grass seed, Whipps Bros 5 00
Best sample of hops, Whipps Bros 2 00
Best bushel of Hungarian grass seed, Whipps Bros 3 00
Best exhibition general assortment of seeds, D. Woodman, Paw Paw 10 00
Best display of several kinds of grain, D. Woodman, Paw Paw 10 00
2d do., Whipps Bros 5 00
Best display of collection of corn in ear, D. Woodman, Paw Paw 10 00
2d do., Whipps Bros 5 00
Best display of collection of several kinds of grasses, etc., Mrs. M. E. Bartlett, Tompkins 10 00
2d do., Whipps Bros., Marion 5 00
Best display of collection of the several kinds of grain in heads, with stool and roots entire, and accompanied by the berry, and with sample of its flour—of such grains as are milled, D. Woodman, Paw Paw, special premium 10 00

T. DENSMORE,
Judge.

CLASS 36—ROOTS AND VEGETABLES.

Best collection of potatoes, Whipps Bros	$10 00
Best peck seedling potatoes grown in State, C. Rawson, Bangor	3 00
Best three varieties early potatoes, Whipps Bros	3 00
2d do., late, Whipps Bros	3 00
Best sample peck any variety early potatoes, Whipps Bros	3 00
2d do., J. H. Baldwin, Kalamazoo	2 00
Best sample peck potatoes, late variety, O. Harrison, Kalamazoo	3 00
2d do., Whipps Bros	2 00
Best peck sweet potatoes, Whipps Bros	3 00
Best six blood beets, J. H. Baldwin	2 00
2d do., Whipps Bros	1 00
Best turnip beets, J. H. Baldwin	2 00
2d do., Whipps Bros	1 00
Best six sugar beets, J. H. Baldwin	2 00
2d do., D. T. Fox, Kalamazoo	1 00
Best white or yellow beets, J. H. Baldwin	2 00
2d do., D. T. Fox, Kalamazoo	1 00
Best six beets, for table use, D. T. Fox, Kalamazoo	2 00
2d do., Whipps Bros	1 00
Best collection of beets, J. H. Baldwin	3 00
2d do., Whipps Bros	2 00
Best six mangel wortzel, J. H. Baldwin	2 00
2d do., Whipps Bros	1 00
Best orange carrots, J. H. Baldwin	2 00
2d do., James A. Taylor, Kalamazoo	1 00
Best six white carrots, J. H. Baldwin	2 00
2d do., Whipps Bros	1 00
Best six carrots other than white, J. H. Baldwin	2 00
2d do., Whipps Bros	1 00
Best collection of carrots, J. H. Baldwin	3 00
2d do., Whipps Bros	2 00
Best six flat turnips, T. B. Lord, Comstock	2 00
2d do., James A. Taylor, Kalamazoo	1 00
Best six swedes turnips, James A. Taylor	2 00
2d do., J. H. Baldwin	1 00
Best six turnips, other than swedes, J. A. Taylor	2 00
2d do., Whipps Bros	1 00
Best collection of turnips, J. A. Taylor	3 00
2d do., Whipps Bros	2 00
Best six parsnips, J. H. Baldwin	2 00
2d do., Whipps Bros	1 00
Best six salsify, Whipps Bros	2 00
2d do., J. H. Baldwin	1 00
Best six winter radishes, Whipps Bros	2 00
Best six summer radishes, Whipps Bros	2 00
Best collection of radishes, Whipps Bros	3 00
Greatest variety, culinary vegetables, Whipps Bros	5 00
Best four heads Drumhead cabbage, J. A. Taylor	2 00
Best dozen stems bleached celery, E. Van Haaften, Kalamazoo	2 00
2d do., M. Wetterling, Ionia	1 00
Best dozen stems rhubarb, J. H. Baldwin, Kalamazoo	2 00
Best six vegetable eggs, Whipps Bros., Marion, O	2 00
Best dozen peppers, Whipps Bros	2 00
2d do., James A. Taylor, Kalamazoo	1 00
Best three varieties tomatoes, Whipps Bros	2 00
Best peck tomatoes, J. A. Taylor, Kalamazoo	2 00
2d do., Whipps Bros	1 00
Best peck white onions, Whipps Bros	2 00
Best peck red onions, Whipps Bros	2 00
2d do., R. Niesink, Kalamazoo	1 00
Best peck yellow onions, Whipps Bros	2 00
Best collection onions, Whipps Bros	3 00
Best five summer squashes, J. H. Baldwin, Kalamazoo	2 00
2d do., Whipps Bros	1 00
Best five marrow squashes, Whipps Bros	2 00
2d do., J. H. Baldwin	1 00

Best five Hubbard squashes, Whipps Bros	$2 00
2d do., Fred Allen, Kalamazoo	1 00
Best single squash, Whipps Bros	2 00
2d do., R. Niesink, Kalamazoo	1 00
Best collection squashes, J. H. Baldwin	3 00
Best two sweet pumpkins, Fred Allen	2 00
Best two field pumpkins, J. H. Baldwin	2 00
2d do., J. Williams, Ostemo	1 00
Best three watermelons, Fred Allen	2 00
Best three nutmeg melons, Fred Allen	2 00
2d do., Elmer Hayden, Almena	1 00
Best collection of melons, James A. Taylor	3 00
Best three citrons, Thomas B. Lord, Comstock	2 00
2d do., Whipps Bros	1 00
Best five cucumbers, Whipps Bros	2 00
Best half peck garden peas, Whipps Bros	2 00
2d do., J. H. Baldwin	1 00
Best half peck Lima beans, Whipps Bros	2 00
Best half peck bush beans, C. W. Rawson, Bangor	2 00
2d do., Whipps Bros	1 00
Best half peck wax beans, Andrew McCleary, Galesburg	2 00
2d do., Whipps Bros	1 00
Best collection garden beans, Whipps Bros	3 00
Best dozen ears of early sweet corn, Whipps Bros	2 00
Best dozen ears of late sweet corn, Whipps Bros	2 00
Best dozen ears of pop corn, Whipps Bros	2 00
2d do., Andrew McCleary, Galesburg	1 00
Best six heads sunflower, Whipps Bros	2 00
Best six stems Swiss chard, J. H. Baldwin	5 00
Best six stems parsley, J. H. Baldwin	2 00
2d do., J. A. Taylor	1 00
Best six stems of any sweet or pot herb, J. H. Baldwin	2 00
Best six stems kohl rahi, J. H. Baldwin	2 00
2d do., Whipps Bros	1 00

SPECIAL PREMIUM TO MIDLAND COUNTY AGRICULTURAL SOCIETY.

The gentlemen from Midland had on exhibition a remarkably fine display of roots, potatoes, gourd fruits and grain roots exceedingly smooth and of excellent quality, on which they were given a special premium of $25.

W. A. ROWE,
Judge.

CLASS 37—DISPLAY OF ROOTS AND VEGETABLES OF PROFESSIONAL GARDENERS.

Best display of roots and vegetables, H. Marx, Detroit	$75 00
3d do., Harry Smith, Grand Rapids	*30 00*

W. A. ROWE,
Judge.

CLASS 38—FLOUR, MEAL AND FEED.

Best barrel white wheat flour, D. B. Merrell & Co., Kalamazoo	$5 00
Best barrel red wheat flour D. B. Merrell & Co	5 00
2d do., Struthers & Merrell, Kalamazoo	3 00
Best barrel spring wheat flour, D. B. Merrell & Co	3 00
Best sample of bolted meal, Whipps Bros., Marion, O.	2 00
2d do., D. B. Merrell & Co	1 00
Best sample corn meal, Struthers & Merrell, Kalamazoo	2 00
2d do., D. B. Merrell & Co	1 00
Best sample ground feed, Struthers & Merrell	2 00
2d do., D. B. Merrell & Co	1 00
Best sample rye flour, D. B. Merrell & Co	2 00
2d do., Whipps Bros	1 00
Best sample Graham flour, Whipps Bros	2 00
2d do., D. B. Merrell & Co	1 00
Best sample oatmeal, Whipps Bros	2 00
2d do., J. H. Baldwin, Kalamazoo	1 00
Best display flour, meal and feed, D. B. Merrell & Co	5 00

Joseph Hughes & Co., of Wayne, Ind., made a very creditable showing of oil meal.

P. HENDERSON,
Judge.

DIVISION G—DAIRY AND OTHER PRODUCTS.

CLASS 39—BUTTER, CHEESE AND DAIRY ARTICLES.

Best twenty-five pounds domestic butter, H. D. Cutting, Clinton	$15 00
2d do., Mrs. Sarah E. Wilson, Three Oaks	12 00
3d do., E. P. Flanders, Galesburg	8 00
Best fifty pounds creamery butter, Henry Chamberlain, Three Oaks	15 00
2d do., H. A. Coe, Constantine	12 00
3d do., Fitch & Cox, Kalamazoo	8 00
Best display of factory cheese, not less than ten cheeses representing makes of three different months, Walter Bordwell, Olivet	25 00
2d do., J. B. Smith, Wayland	15 00

FRANKLIN WELLS,
CYRUS G. LUCE,
Judges.

CLASS 40—SUGAR, BREAD AND PICKLES.

Best ten pounds maple sugar, G. M. & E. Davenport, Woodland	5 00
2d do., D. S. Garver, Hart	3 00
Best one gallon maple syrup, H. H. Pratt, Shelby	3 00
2d do., D. S. Garver, Hart	2 00
Best milk or salt rising bread, three loaves, M. H. Chisholm, Marshall	3 00
2d do., Miss Lucy McCleary, Galesburg	2 00
3d do., salt rising bread, Miss Lucy McCleary, Galesburg	1 00
Best three loaves yeast bread, Miss L. G. DeFoe, Kalamazoo	3 00
2d do., Mrs. W. Judson, Schoolcraft	1 00
Best corn bread, Miss Belle White, Kalamazoo	3 00
2d do., M. H. Chisholm, Marshall	2 00
Best three loaves brown, or rye and Indian bread, Miss Belle White, Kalamazoo	3 00
2d do., Mrs. C. Kingsley, Kalamazoo	2 00
Best flour bread made by girl 16 years old or under, Miss Lulu White, Kalamazoo	3 00
2d do., Miss Mary Elder, Kalamazoo	2 00
Best sample brown bread made by girl 16 years old or under, Miss Lulu White, Kalamazoo	3 00
Best display of pickles, pickled vegetables, Mrs. A. M. Stearns, Kalamazoo	5 00
2d do., Nellie S. Nabors, Flint	3 00

NON-ENUMERATED.

Best display canned fruits, Nellie S. Nabors	3 00
Best display canned vegetables, Nellie S. Nabors	2 00

FRANKLIN WELLS,
C. G. LUCE,
Judges.

DIVISION H—BEES, HONEY, ETC.

CLASS 42—BEES, HONEY AND APIARIAN IMPLEMENTS.

Best colony black bees in movable comb hives, W. Z. Hutchinson, Rogersville	$10 00
2d do., Elmer Hutchinson, Rogersville	5 00
Best colony Italian bees in movable comb hive, R. S. Taylor, Lapeer	10 00
2d do., Elmer Hutchinson, Rogersville	5 00
Best colony Syrian bees in movable comb hive, Elmer Hutchinson	10 00
2d do., W. Z. Hutchinson	5 00
Best colony Carniolan bees, W. Z. Hutchinson	10 00
2d do., Elmer Hutchinson	5 00
Best display of full colonies of the different races of bees, W. Z. Hutchinson	10 00
2d do., Elmer Hutchinson	5 00
Best specimen comb honey, not less than 20 lbs., R. S. Taylor, Lapeer	10 00
2d do., Elmer Hutchinson	5 00
Best display of comb honey, most attractive, W. Z. Hutchinson	20 00
2d do., O. H. Townsend, Alamo	10 00

Best specimen extract honey not less than 20 lbs., O. H. Townsend	$8 00
2d do., W. D. Cutting, Clinton	4 00
Best display extracted honey, most attractive, W. Z. Hutchinson	12 00
2d do., H. D. Cutting	6 00
Best display comb honey by lady, Anna R. Cutting, Clinton	10 00
Best beeswax not less than 10 pounds, H. D. Cutting	5 00
2d do., W. Z. Hutchinson	3 00
Best bee feeder, W. Z. Hutchinson	2 00
2d do., Elmer Hutchinson	1 00
Best bee smoker, H. D. Cutting, Clinton	2 00
2d do., W. Z. Hutchinson	1 00
Best bee hive for all purposes, W. Z. Hutchinson	5 00
2d do., H. D. Cutting	3 00
Best comb foundation machine, I. Van Derurst, Laceyville, Pa	8 00
2d do., R. S. Taylor, Lapeer	5 00
Best comb foundation made on the grounds, R. S. Taylor	4 00
2d do., I. Van Derurst, Laceyville, Pa	3 00
Best comb foundation specimen, R. S. Taylor Lapeer	4 00
2d do, H. D. Cutting	2 00
Best honey extractor, H. D. Cutting	5 00
2d do, C. Barkenbus, Kalamazoo	3 00
Best honey knife, H. D. Cutting	2 00
2d do, W. Z. Hutchinson	1 00
Best machine for making holes in frames for wiring, H. D. Cutting	2 00
2d do, R. S. Taylor	1 00
Best queen cage for introducing queens, C. H. Townsend	2 00
2d do, H. D. Cutting	1 00
Best queen cage for shipping queens, W. Z. Hutchinson	2 00
2d do, H. D. Cutting	1 00
Best section box for comb honey, H. D. Cutting	2 00
2d do, W. Z. Hutchinson	1 00
Best wax extractor, W. Z. Hutchinson	3 00
Best display of apiarian implements, H. D. Cutting	10 00
2d do, W. Z. Hutchinson	5 00
Best collection of honey-producing plants, pressed and mounted, or in bloom, W. Z. Hutchinson	10 00
2d do, E. Hutchinson	5 00
Best collection of bee literature, W. Z. Hutchinson	10 00
2d do, H. D. Cutting	5 00
Largest, best, and most interesting and instructive exhibition in this department, W. Z. Hutchinson, Rogersville	10 00

A. J. COOK,
Judge.

DIVISION L—MANUFACTURED GOODS.

CLASS 52—MATERIALS.

Best display of fine wools, C. Hibbard & Son, Bennington	$7 00
2d do, F. M. Dean, Pewamo	5 00
3d do, L. W. & O. Barnes, Byron	3 00
Best display of long wools, Frank Willson, Jackson	7 00
Best display of middle wools, Mrs. M. E. Bartlett, Tompkins	7 00
2d do, Frank Willson, Jackson	5 00
Best display of flax, Andrew McCleary, Galesburg	5 00
Best display of prepared flax, Miss Lucy McCleary, Galesburg	5 00
2d do, Miss Sarah Barber, Fairfield	3 00

JOHN DUDGEON,
GEO. SMILEY,
R. BISHOP,
Judges.

CLASS 55—ARTICLES OF LEATHER AND INDIA RUBBER.

Best display of trunks, Dunham & Hoyt, Kalamazoo	$10 00
Best double carriage harness, Kalamazoo Wagon Co., Kalamazoo	3 00
Best single buggy harness, Kalamazoo Wagon Co., Kalamazoo	3 00
2d do, Kalamazoo Wagon Co	2 00

Best display of boots and shoes, made in Michigan, J. C. Bennett & Son, Kalamazoo	$10 00

JOHN DUDGEON,
GEO. SMILEY,
R. BISHOP,
Judges.

CLASS 56—ARTICLES OF FURNITURE.

Best set of parlor furniture, Horace Prentice, Kalamazoo	$20 00
Best set of chamber furniture, Horace Prentice	10 00
Best mantle mirror, Horace Prentice	5 00
Best easy chair, Horace Prentice	3 00
Best hall tree rack, Horace Prentice	2 00
Best couch, Horace Prentice	3 00
Best office desk, Horace Prentice	3 00
Best parlor writing desk, Horace Prentice	3 00
Best pier mirror, Horace Prentice	5 00
Best spring mattress, D. Edgar, Adrian	2 00

NON-ENUMERATED.

Display electric door bells, gas-lighters, burglar alarm, etc., Clarage & Hillhouse, Kalamazoo	$3 00

JOHN DUDGEON,
GEO. SMILEY,
R. BISHOP,
Judges.

CLASS 57—IRON AND ORNAMENTAL WORK, NON-ENUMERATED.

Automatic bank punch, O. J. Stone, Kalamazoo	$3 00
House numbers, signs and decorated tile, W. P. McKenna, Detroit	5 00

JOHN DUDGEON,
GEO. SMILEY,
R. BISHOP,
Judges.

DIVISION N—ART.

CLASS 61—PAINTING AND SCULPTURE.

Best animal piece in oil, from life by exhibitor, W. H. Machen, Detroit	10 00
2d do., H. M. Peck, Allegan	5 00
Best animal piece in water colors by exhibitor, W. H. Machen	5 00
2d do., Eugene Torry, Kalamazoo	3 00
Best bird piece in oil by exhibitor, W. H. Machen, Detroit	5 00
2d do., Mrs. I. N. Wattles, Kalamazoo	3 00
Best composition landscape in oil by exhibitor, W. H. Machen	5 00
2d do., H. M. Peck, Allegan	3 00
Best collection of oil paintings by person not a dealer, Robert Hopkin, Detroit	10 00
2d do., W. H. Machen, Detroit	5 00
Best collection of oil paintings by a dealer, or association, A. J. Brow, Detroit	25 00
Best collection watercolors, by a person not a dealer, Robert Hopkin, Detroit	3 00
2d do., Eugene Torry, Kalamazoo	2 00
Best display of decorated porcelain, Miss L. Brown, Kalamazoo	10 00
2d do., Miss L. Holtenhouse, Kalamazoo	5 00
Best fruit piece in oil by exhibitor, W. H. Machen, Detroit	5 00
2d do., Miss Lizzie Merriman, Kalamazoo	3 00
Best flower piece in oil by exhibitor, W. H. Machen, Detroit	5 00
2d do., Mrs. I. N. Wattles, Kalamazoo	2 00
Best fancy painting in oil by exhibitor, Eugene Torry, Kalamazoo	5 00
2d do., Robert Hopkin, Detroit	3 00
Best fancy painting in water colors, Robert Hopkin	5 00
2d do., Eugene Torry, Kalamazoo	3 00
Best historical painting in oil by exhibitor, Eugene Torry, Kalamazoo	10 00
Best historical painting in oil by any person, A. J. Brow, Detroit	20 00
2d do., A. J. Brow	10 00
Best landscape painting in oil, of scenery in Michigan, A. J. Brow	10 00
2d do., Mrs. H. D. Bowling, Dowagiac	5 00

Best landscape from nature in oil by exhibitor, Robert Hopkin	$10 00
2d do., Mrs. H. D. Bowling, Dowagiac	5 00
Best landscape painting in oil by any person, A. J. Brow	10 00
2d do., A. J. Brow	5 00
Best landscape in water colors by exhibitor, Robert Hopkin	10 00
Best landscape in watercolors of scenery in Michigan, Eugene Torry, Kalamazoo	8 00
Best marine scene in oil by exhibitor, Robert Hopkins	10 00
Best marine scene in oil by any person, A. J. Brow	10 00
2d do., A. J. Brow	5 00
Best oil painting by a person under 16 years old, Miss Machen, Detroit	5 00
Best large oil portrait from life by exhibitor, W. B. Conely, Detroit	10 00
2d do., Miss Flora Tompkinson, Kalamazoo	5 00
Best cabinet size oil portrait from life by exhibitor, W. H. Machen	5 00
Best oil portrait by any person, A. J. Brow	10 00
2d do., A. J. Brow	5 00
Best portrait in water colors by exhibitor, Eugene Torry, Kalamazoo	5 00
Best pastel portrait of face, J. M. Dennis, Detroit	3 00
Best pastel landscape painting, A. J. Brow	3 00
2d do., A. J. Brow	2 00
Best painting on porcelain, Mrs. M. Turner, Kalamazoo	3 00
2d do., Miss E. S. McKee, Kalamazoo	2 00
Best special subject in oil, A. J. Brow	5 00
2d do., A. J. Brow	3 00
Best special subject in water colors, A. J. Brow	3 00
2d do., Eugene Torry, Kalamazoo	2 00
Best specimen painting on ebonized panel, Miss E. S. McKee, Kalamazoo	3 00
2d do., Mrs. M. B. Westneye, Kalamazoo	2 00
Best specimen painting on holly, Miss Lizzie Merriman, Kalamazoo	2 00
Best specimen painting on plaque, Miss E. S. McKee, Kalamazoo	3 00
2d do., Mrs. M. Westbrook, Kalamazoo	2 00
Best specimen painting on slate, Miss E. S. McKee, Kalamazoo	3 00
Best specimen painting on silk, Miss Nellie Heusted, Fenton	3 00
2d do., Mrs. L. P. Crum, Kalamazoo	2 00
Best specimen painting on shell, Miss E. S. McKee, Kalamazoo	3 00
Best winter piece in oil by exhibitor, Robert Hopkin	5 00
2d do., *Mrs. M. J. Glover, Kalamazoo*	3 00
Best winter piece in oil by any person, A. J. Brow	5 00
Best crayon drawing of face, Miss Dikeman, Three Rivers	5 00
2d do, J. M. Dennis, Detroit	2 00
Best crayon drawing of animal, H. M. Peck, Allegan	2 00
Best India ink drawing, Michigan Portrait Art Co., Charlotte	3 00
Best colored photograph portrait, Miss Nellie Heusted, Fenton	2 00
Best display of gilt frames, A. J. Brow	5 00
Best display of picture frames, A. J. Brow	5 00

NON-ENUMERATED.

Still life in oil, Mrs. H. D. Bowling, Dowagiac	$2 00
Hammered brass umbrella stand, *Miss L. G. Holtenhouse, Kalamazoo*	2 00
Animal piece in oil (copied), Miss Lizzie Merriman, Kalamazoo	2 00
Collection lustre paintings and etchings, C. F. Moore, Detroit	5 00
Specimen painting on glass, Mrs. M. Westbrook, Kalamazoo	2 00
Painting on plush, Mrs. I. N. Reed, Kalamazoo	1 00
Mirror frame, Mrs. J. S. Holman, Kalamazoo	1 00
Mirror frame, Miss E. S. McKee, Kalamazoo	2 00
Painting on plaque, Miss Nellie D. Turner, Kalamazoo	2 00
Crayon, Palmiter & Warrant, Kalamazoo	2 00
Painting on velvet, Miss Nellie Heusted, Fenton	1 00
Specimen penmanship, C. H. Stellman, Alamo	1 00
Pair ornamental vases, Mrs. M. Turner, Kalamazoo	1 00
Display of artists' supplies, etc., R. W. Southworth, Kalamazoo	15 00
Collection India ink drawings, Miss Ida Thurston, Three Oaks	2 00
Specimen painting on wood, Delos Phillips, Kalamazoo	1 00

FOSTER PRATT,
JOSEPH SILL,
F. B. STOCKBRIDGE,
Judges.

DIVISION O—NEEDLE AND FANCY WORK.

CLASS 63—ARTICLES OF LADIES' DRESS.

Best child's suit, Mrs. S. G. Cole, Romeo	$2 00
2d do, Miss Mamie Graham, Leonidas	1 00
Best corset, Miss H. Sullings, Kalamazoo	2 00
2d do, Miss H. Sullings	1 00
Best display of millinery goods, C. C. Chapen, Kalamazoo	5 00
Best trimmed bonnet, C. C. Chapen	2 00
Best ladies' trimmed hat, C. C. Chapen	2 00
Best suit of undergarments, Miss A. M. Stearns, Kalamazoo	2 00
Best corset waist, M. E. Davis, Jackson	1 00
2d do, M. E. Davis	50

CLASS 64—PLAIN NEEDLE AND MACHINE WORK.

Best braiding by hand, Miss M. J. Glover, Kalamazoo	1 00
2d do, Mrs. Charles Sterrett, Dowagiac	50
Best sample darning, Miss A. M. Stearns, Kalamazoo	1 00
2d do, M. A. Chisholm, Marshall	50
Best fine shirt by hand, Mrs. P. A. Ware, Mattawan	2 00
2d do, Mrs. C. H. Goodrich, Kalamazoo	1 00
Best specimen hemstitching, Miss L. Holtenhouse, Kalamazoo	1 00
2d do, Miss M. L. Fisher, Kalamazoo	1 00
Best patched garment, Mrs. M. E. Bartlett, Tompkins	1 00
2d do, Mrs. C. H. Stanley, Kalamazoo	50
Best pair plain handkerchiefs, Mrs. C. H. Stanley	1 00
2d do, Mrs. M. E. Bartlett, Tompkins	50
Best pair plain pillow cases by hand, Miss Lucy McCleary, Galesburg	1 00
2d do, Mrs. A. M. Stearns, Galesburg	50
Best pair plain sheets, Mrs. C. H. Stanley, Kalamazoo	1 00
2d do, Mrs. M. E. Bartlett, Tompkins	50
Best quilt, plain white muslin, Mrs. W. F. Mills, Kalamazoo	2 00
2d do, Miss Jennie W. Noble, Kalamazoo	1 00
Best quilt, calico patch work, Miss Florence M. Wilcox, Marshall	2 00
2d do, Mrs. W. B. Cole, Kalamazoo	1 00
Best quilt, silk patch work, Midland County Fair Association, Midland	5 00
2d do, Miss L. G. De Yoe, Kalamazoo	3 00
Best worsted patch work, Miss Nellie S. Heusted, Fenton	2 00
2d do, Mrs. M. L. Fisher, Kalamazoo	1 00
Best quilt, machine made, Mrs. M. L. Fisher, Kalamazoo	1 00
Best log cabin quilt, Miss Eliza Seymour, Kalamazoo	3 00
Best fine skirt, Miss M. Westbrook, Marshall	2 00
Log cabin quilt, Mrs. George S. Barrett, Kalamazoo	2 00
Skirt, Miss N. Graham, Leonidas	1 00

CLASS 65—EMBROIDERY AND ORNAMENTAL NEEDLE WORK.

Best Arrasene embroidery, Domestic S. M. Co., Detroit	2 00
2d do., Miss L. G. De Yoe, Kalamazoo	1 00
Best specimen chenille embroidery, Mrs. Elmer Hills, Delaware, Ohio	2 00
2d do., Mrs. Chas. Sterrett, Dowagiac	1 00
Best specimen crewel embroidery, Miss Lucy McCleary, Galesburg	2 00
Best specimen Kensington embroidery, Miss L. Brown, Kalamazoo	2 00
2d do., Miss Nellie S. Heusted, Fenton	1 00
Best collection of embroidery, Mrs. Elmer Hills, Delaware, Ohio	6 00
2d do., Mrs. Chas. Sterrett, Dowagiac	4 00
Best embroidered banner, Mrs. Chas. Sterrett, Dowagiac	2 00
2d do., Miss Nellie Heusted, Fenton	1 00
Best embroidered ottoman cover, in worsted, Mrs Chas. Sterrett, Dowagiac, second premium	1 00
Best embroidered ottoman, in silk, Mrs. Elmer Hills, Delaware, Ohio	2 00
2d do., Miss Helen M. Peck, Allegan	1 00
Best embroidered fire screen, Miss L. Holtenhouse, Kalamazoo	4 00
2d do., Domestic Sewing Machine Co., Detroit	2 00
Best embroidered handkerchief, Miss L. Brown, Kalamazoo	1 00
2d do., Miss L. Holtenhouse, Kalamazoo	50

Best embroidered infants' blanket, in silk, Mrs. Elmer Hills, Delaware, Ohio	$2 00
2d do., Miss L. Holtenhouse, Kalamazoo	1 00
Best embroidered infants' dress, in silk, Mrs. Elmer Hills, Delaware, Ohio	2 00
Best embroidered letters in silk, Miss Nellie S. Heusted, Fenton, 2nd premium	50
Best embroidered lady's cloak, in silk, Mrs. Elmer Hills, Delaware, Ohio	3 00
Best embroidered pillow shams, in cotton or linen, Mrs. M. G. Glover, Kalamazoo	2 00
2d do., Mrs. A. M. Stearns, Kalamazoo	1 00
Best embroidered table cover, Miss L. Holtenhouse, Kalamazoo	4 00
2d do., Mrs. Henry J. Allen, Schoolcraft	2 00
Best embroidered sofa pillow, Miss L. Brown, Kalamazoo	3 00
2d do., Mrs. Elmer Hills, Delaware, Ohio	1 00
Best embroidered tidy, in silk, Mrs. J. B. Cobb, Kalamazoo	2 00
2d do., Mrs. A. M. Stearns, Kalamazoo	1 00
Best embroidered toilet set, Mrs. J. B. Cobb	2 00
Best embroidered table scarf, Mrs. I. N. Wattles, Kalamazoo	2 00
2d do., Miss Nellie S. Heusted, Fenton	1 00
Best sample cut or tufted work, Mrs. M. E. Bartlett, Tompkins	2 00
2d do., Mrs. W. F. Mills, Kalamazoo	1 00
Best collection lace work, Mrs. M. Turner, Kalamazoo	3 00
2d do., Mrs. W. F. Mills, Kalamazoo	2 00
Best specimen Honiton lace, D. M. Cohn, Kalamazoo	2 00
2d do., Mrs. W. F. Mills, Kalamazoo	1 00
Best drawn work specimen, Miss L. Brown, Kalamazoo	2 00
2d do., Miss L. G. De Yoe, Kalamazoo	1 00
Best darned net pillow sham, Miss Nannie Graham, Leonidas	3 00
2d do., Mrs. E. S. Botsford, Door	2 00
Best etching in silk, Domestic Sewing Machine Co., Detroit	2 00
2d do., Miss L. Brown, Kalamazoo	1 00
Best fancy pin cushion, Miss H. M. Peck, Allegan	1 00
Best fancy bag, Miss L. G. De Yoe, Kalamazoo	1 00
2d do., Mrs. M. L. Fisher, Kalamazoo	50
Best fancy apron, Miss L. Holtenhouse, Kalamazoo	1 00
2d do., Mrs. E. Vickery, Kalamazoo	50
Best home-made rug, knit, Mrs. H. C. Forbes	2 00
2d do., H. M. Peck, Allegan	1 00
Best home-made rug, drawn, Mrs. L. G. Armstrong, Waverly	2 00
2d do., Miss L. G. De Yoe, Kalamazoo	1 00
Best pair silk slippers, Mrs. Elmer Hills, Delaware, Ohio	1 00
2d do., Mrs. Chas. Sterrett, Dowagiac	50
Best specimen macrame work, Miss Florence M. Wilcox, Marshall	2 00
2d do., Miss N. E. Wilder, Kalamazoo	1 00
Best mantle lambrequin, Mrs. C. E. Kingsley, Kalamazoo	2 00
Best specimen rick-rack, Mrs. W. B. Cole, Kalamazoo	1 00
Best specimen raised work, Miss Nellie S. Heusted, Fenton	1 00
Best toilet set, lace muslin, Miss L. Brown, Kalamazoo	1 00
2d do., Mrs. M. J. Glover, Kalamazoo	50
Best specimen tatting, Miss Grace Reshore, Dowagiac	1 00
2d do., Miss Amy Day, Kalamazoo	50
Best specimen darned net work, Mrs. Otis Goss, Kalamazoo	1 00
2d do., Mrs. E. S. Botsford, Door	50

NON-ENUMERATED.

Tufted work, sofa pillow, Mrs. Marie Bennett, Kalamazoo, discretionary	2 00
Worsted picture, D. M. Cohn, Kalamazoo	5 00
Stuffed doves, Mrs. M. Turner, Kalamazoo	1 00
Knitt lace tidy, Mrs. I. N. Wattles, Kalamazoo	50

Mrs. J. ELY KELLOGG,
MRS. J. J. GRIFFITHS,
Judges.

CLASS 66—CROCHET, KNIT AND FANCY WORK.

Best Afghan robe, Kate McSweeney, Kalamazoo	5 00
2d do., Miss Evelyn E. Paddock, Girard	3 00
Best bedspread, Mrs. Henry J. Allen, Schoolcraft	3 00
2d do. Mrs. Amy Day, Kalamazoo	2 00

Best cotton tidy, Mrs. Henry J. Allen, Schoolcraft	$2 00
2d do., A. M. Schad, Kalamazoo	1 00
Best cloak, crochet or knit, Miss Grace Reshore, Dowagiac	2 00
2d do., Miss Nannie Graham, Leonidas	1 00
Best child's shirt, crochet or knit, Mrs. E. S. Botsford, Door	2 00
2d do., Miss Carrie A. Choate, Jackson	1 00
Best collection of work in class 66 by one person, Mrs. M. E. Bartlett, Tompkins	5 00
2d do., Miss Carrie A. Choate, Jackson	3 00
Best fancy mittens, Miss Carrie A. Choate, Jackson	2 00
2d do., Mrs. M. J. Glover, Kalamazoo	1 00
Best fancy purse, silk, crochet or knit, Mrs. A. V. Harris, Kalamazoo	1 00
2d do., P. A. Ware, Mattawan	50
Best gent's scarf, P. A. Ware, Mattawan	2 00
Best hood, Miss Grace Reshore, Dowagiac	2 00
2d do., Miss Carrie A. Choate, Jackson	1 00
Best infant's shoes, crochet or knit, Miss Carrie A. Choate, Jackson	1 00
2d do., Miss N. E. Wilder, Kalamazoo	50
Best leggings, crochet or knit, Mrs. P. A. Ware, Mattawan	2 00
Best ladies' sacque, crochet or knit, Grace Reshore, Dowagiac	2 00
Best ladies' shoes, crochet or knit, Grace Reshore, Dowagiac	1 00
2d do., Miss Nellie S. Heusted, Fenton	50
Best pair toilet mats, Mrs. M. E. Bartlett, Tompkins	1 00
Best skirt, crochet or knit, Miss Nannie Graham	2 00
2d do., Mrs. C. M. Byson, Kalamazoo	1 00
Best shawl, crochet or knit, Miss L. Brown, Kalamazoo	3 00
2d do., Miss Grace Reshore, Dowagiac	2 00
Best trimming, crochet, Mrs. S. G. Cole, Romeo	1 00
2d do., Mrs. C. H. Stanley, Kalamazoo	50
Best worsted tidy, Miss Evelyn E. Paddock, Girard	1 00
2d do., Mrs. Charles Sterrett, Dowagiac	50

NON-ENUMERATED.

Drapery curtain, crochet border, Mrs. M. Westbrook, Kalamazoo	5 00
Specimen knitted work, Miss Ella A. Butler, Union City	2 00
Crochet hassock, Mrs. C. Kingsley, Kalamazoo	1 00
Fancy knit stockings, Mrs. J. B. Cobb, Kalamazoo	1 00

MISS LIZZIE HOLTENHOUSE,
MISS LILLIAN G. DEYEO,
Judges.

CLASS 67—HAIR, SHELL AND WAX WORK.

Artificial flowers by hand, Miss Nellie S. Heusted, Fenton	$2 00
Best bouquet, Miss Florence M. Wilcox, Marshall	2 00
2d do., Mrs. M. E. Bartlett, Tompkins	1 00
Feather fan, Mrs. M. J. Glover, Kalamazoo	1 00
Best display hair work, Mrs. A. L. Hobbs, Kalamazoo	3 00
2d do., Miss Emma L. Hubbard, South Haven	2 00
Display dried grasses, F. Gerdes, New Buffalo	2 00

NON-ENUMERATED.

Display of silk worms, Miss Stace, Marshall	3 00

MISS LILLIAN G. DEYEO,
MISS LIZZIE HOLTENHOUSE,
Judges.

DIVISION P—MISCELLANEOUS.

CLASS 68—MISCELLANEOUS ARTICLES.

Best soft ground horse shoes, L. Brigham, Orangeville	$2 00
Best display of cooperage, J. G. Smith, Kalamazoo	1 00
Best hand made horse shoe, H. J. Winters & Bros., Eaton Rapids	2 00
Best display monumental work, Detroit White Bronze Co., Detroit	10 00
Best fruit dryer, Vermont Farm Machine Co., Bellows Falls, Vt.	5 00

GEORGE H. MUNTOCK,
Judge.

DIVISION Q—CHILDREN'S DEPARTMENT.

Best specimen hand sewing, Eva Stearns, Kalamazoo	$2 00
2d do., Belle White, Kalamazoo	1 00
Best specimen machine sewing, Eva Stearns, Kalamazoo	1 00
Best specimen patching, Eva Stearns, Kalamazoo	1 00
Best specimen darning, Eva Stearns, Kalamazoo	1 00
Best patchwork quilt by hand, in silk, Lena Sterrett, Dowagiac	2 00
Best specimen penmanship, Belle White, Kalamazoo	1 00
Best calico dress by hand, Belle White, Kalamazoo	1 00
Best sample jelly, Eva Stearns, Kalamazoo	1 00
Best sample canned fruit, Belle White, Kalamazoo	1 00
2d do., Eva Stearns, Kalamazoo	50
Best sample canned vegetables, Eva Stearns, Kalamazoo	1 00
Best bouquet wild flowers, Belle White	50

MISS LIZZIE HOLTENHOUSE,
MISS LILLIAN G. DEYOE,
Judges.

REPORTS FROM LOCAL SOCIETIES.

ALPENA COUNTY AGRICULTURAL SOCIETY.

To the Secretary of the State Agricultural Society:

DEAR SIR:—I hereby submit my report of the eighth annual Fair of Alpena County Agricultural society, held Oct. 7th and 8th, 1885.

RECEIPTS.

Total receipts including county appropriation		$555 14

DISBURSEMENTS.

For premium per annexed schedule	$259 25	
All other incidental expenses	132 81	
Total		$392 06
Balance excess of above		$163 08

Against which balance there is to be paid the annual interest on the bonded debt of the Association, about $225 00.

CLASSIFICATION OF PREMIUMS AWARDED.

Department A.

Class.		
1	Horses	$43 50
2	Shorthorn cattle	3 00
4	Holsteins	25 50
5	Grades	18 00
7	Long wool sheep	18 00
8	Swine	3 00
9	Poultry	2 00

Department B.

Class.		
1	Grain	$22 50
2	Roots, etc	39 50
3	Fruits	12 00

Department C.

Class.		
1	Flowers	$8 00
2	Ornamentals, etc	6 50
3	Domestic	18 00

Department D.

Class.		
1	Dairy and Household	$24 75
2	Domestic and Mechanical	15 00
		$259 25

All of which is respectfully submitted.

W. E. ROGERS,
Secretary.

ALPENA, Nov. 23d, 1885.

AVON AGRICULTURAL SOCIETY.

REPORT FOR THE YEAR ENDING DEC. 17, 1885.

To the Secretary of the State Agricultural Society:

DEAR SIR—On January 13, 1885, was held the annual meeting of the Society, at which the amendments to Articles fifth and sixth of the Articles of Association (presented at our last annual meeting, and laid upon the table for further consideration), was taken from the table and adopted. The amendment provides that "each member shall be entitled to but one vote" (and not one vote for each share of stock held by a member or stockholder, as heretofore).

The following officers were elected for the ensuing year:

President—John M. Norton.

Treasurer—Enos R. Mathews.

Secretary—Theo. Dahlman.

Directors—J. Van Hoosen, O. H. P. Griggs, G. G. Green, H. L. Lintz, W. W. Thorington, I. Barwise, W. Graham, J. G. Toles, E. H. Dewey.

April 18, J. M. Norton resigned as President and John J. Snook was appointed to fill vacancy.

July 25, E. R. Mathews resigned as Treasurer and Arthur E. Collins was appointed to fill vacancy.

The sixth Annual Fair of this society was held October 13, 14, 15 and 16, and was as a whole a very successful and pleasant one, notwithstanding the extreme inclemency of the weather on the first day, which caused the Board of Directors to extend the time *one day* for the receiving of entries, sixteen hundred and ninety-five of which were recorded.

The Honorable Lorenzo Babcock, of New York, delivered an able and interesting address "On Farming" to our people on the third day, which was duly appreciated by the society.

The rule prohibiting gambling, and the selling of liquors of all kinds on the grounds, was strictly enforced, much to the interest of the society, as we believe.

Over twelve hundred entrance tickets were sold each day (on an average).

All the departments of the Rochester schools (comprising over three hundred pupils) were dismissed a half day on account of the Fair, and all children under ten years of age were admitted free.

The following is a condensed statement of the entries at same and the premiums awarded, etc.

Membership numbers 178 for 1885.
Total number of Premiums awarded was 793.

In Class.		Entries Made.	Premiums Paid.
1	Cattle—Shorthorn	31	$25 75
2	" Devons	12	13 25
6	" Jerseys	5	5 75
8	" Guernseys	9	Not shown.
9	" Grades	17	12 75
10	" Milch cows	2	3 50
11	" Herds	5	9 00
12	Horses—All work	56	36 75
13	" Draught	11	19 00
14	" Roadsters	49	34 75
15	" Carriage	60	18 50
16	Sheep—American Merino	10	16 00
17	" Michigan Merino	11	16 00
18	" Fine wool	17	14 00
19	" Coarse wool	12	13 25
20	" Downs	18	15 00
22	Swine—Suffolk	2	3 50
23	" Berkshire	9	6 00
24	" Poland China	15	11 75
25	" Ch. Co. White	7	7 00
27	" Grades	6	6 50
28	Poultry—44 varieties	98	23 85
29	Fruits—52 varieties	214	34 00
30	Vegetables—42 varieties	145	27 25
31	Seeds—20 varieties	96	15 75
32	Big things—29 varieties	94	7 25
33	Canned fruits, pastry, etc	132	20 00
34	Farm Implements	11	7 00
35	Hardware	7	1 25
36	Wagons, etc	9	6 50
37	Boots, shoes, and harness	15	6 50
38	Cabinet ware	9	5 25
39	Musical instruments	5	4 00
40	Sewing machines and work	9	3 50
42	Ladies' home-made work	67	19 00
43	Ladies' needle work	129	36 75
44	Crochet, knitting and fancy work	83	17 25
45	Drawings and paintings	98	27 75
46	Flowers—20 varieties	49	21 50
47	Childrens' department	16	2 75
48	Miscellaneous	26	6 00
49	Trials of speed—Green race	5	30 00
	" Stallion race	3	45 00
	" Three minute race	4	30 00
	" Farmers' race	7	30 00
	Totals	1695	$716 10

Paid above less ¼ on all except Class 49, which was paid in full. (¾ x $581 10=$435.-82). ($435 82 + $135 00=$570 82).*

RECEIPTS FOR THE YEAR 1885.

Balance on hand December 17th, 1884	$18 00
Premiums for 1884, uncalled for	4 24
From membership tickets sold	178 00
From admission tickets sold at Fair	495 75
From entrance fees in trials of speed (Class 49)	73 50
From booths and stand rents	55 00
From horse stall rents	25 00
From rent of grounds for pasture	25 00
Total	$874 49

EXPENDITURES FOR SAME.

For amount due from 1884—(not paid in)	$ 2 00
For rent paid	56 00
For interest paid	52 60
For secretary's salary paid	50 00
For other help, paid	17 00
For printing paid and due	56 38
For stationery paid and due	12 08
For forage, paid	30 37
For sundries and repairs, paid	9 50
Premiums paid and due (less 18 cents excess on calculating discount)	* 570 64
Total	$856 63
Leaving balance on hand	$17 80

All of which is respectfully submitted.

Signed at Rochester, Oakland county, Michigan, December 17th, 1885.

JOHN J. SNOOK, *President.*
THEO. DAHLMANN, *Secretary.*
A. E. COLLINS, *Treasurer.*

EMMET DISTRICT AGRICULTURAL ASSOCIATION.

This Association organized and filed its articles of association with James Cogley, President; Dr. A. J. Abbott, Secretary; James Kennedy, Treasurer; and for Directors, John Dunnigan, Wm. Power, Wm. Cogley, Wm. W. Ross and Byron Parke.

A plot of land consisting of nearly seven acres was leased for ten years and fenced with close board fence, about three-fourths of it 6 feet high and the rest 8 feet high.

An exhibition building was erected whose dimensions are 31x76x12, which is shingle roofed and floored with hardwood planed flooring.

Also a convenient office at the gate. Upon the grounds were erected accommodation for about thirty horses and as many cattle in divided sections which are roofed with boards. Pens for swine and sheep are provided so as to accommodate a goodly number.

A first class well with pump was provided by the association, all of which is in good condition.

There is a good four rod track for exhibition purposes on the grounds stretching about one-third of a mile. With a gay flag-pole of hickory and oak towering one hundred feet above it, the grounds of the Emmet District Agricultural Association are such as its projectors may well feel proud of.

With the exception of three donations the entire funds at the command of the officers were the product of the fall fair of '85.

Of amounts received from without, Emmet Village donated the handsome sum of $100. A concert in aid of the building fund netted $58.27, and from a fund from a spring fair held here in 1885, the association received about $13.

Since the organization the association has paid

Sundry expenses including freight	$102 00
Lumber and shingles	410 78

Posts	$60 46
Hinges, locks, windows	67 39
Printing	48 50
Labor	161 77
Hay	10 36
Premiums—(very many kindly donate premiums)	31 65
Rent	35 00
Total	$927 88

In payment of rent and lumber the association has given its note of $356.22 on lumber and $35 on rent.

The treasurer holds a balance of $50.75. With the experience of 1885, the association hopes in 1886 to make a showing equal to any similar organization in the State of Michigan.

JAMES COGLEY, *President.*
DR. A. J. ABBOTT, *Secretary.*
JAS. KENNEDY, *Treasurer.*

MANISTEE COUNTY AGRICULTURAL SOCIETY.

This society held its ninth Annual Fair at Bear Lake on the 23d, 24th and 25th days September, 1885. The weather was very favorable. Total number of entries, 692 against 907 in 1884.

Marked improvement was manifested in the display of cattle and horses and the display of fruits was very good.

The society owns twenty acres of land beautifully situated on the south side of Bear Lake. Twelve acres are enclosed for fair grounds and the balance is in woods. Value, $1,000.

Premiums paid	$225 10
Cost of repairs, printing, etc	54 26
Salaries	40 00
Paid on indebtedness	134 09
Total	$453 45

OFFICERS ELECTED FOR 1886.

President—Henry A. Danville, Marilla P. O.
Secretary—John N. Brodie, Bear Lake.
Treasurer—James Dodd, Bear Lake.

JOHN N. BRODIE.
Secretary.

BEAR LAKE, February, 1886.

UNION AGRICULTURAL SOCIETY.

Statement showing the receipts and disbursements of the Union Agricultural Society of the St. Joseph valley for the year ending December 20, 1885:

RECEIPTS.

Stock issued	$23 33
Gate receipts	1,578 16
Rent of booths and licenses	180 25
Dining hall	231 83
Grand stand	66 76
Horse stalls	55 00
Speed entries	118 40
Total	$2,253 73

DISBURSEMENTS.

Printing	$51 63	
Premiums	743 25	
Speed premiums	292 33	
Indebtedness	268 06	
Labor, supplies in dining hall, police and amount on hand	898 46	
		$2,253 73

We, the President, Secretary and Treasurer of the Union Agricultural Society, located at Litchfield, Michigan, do hereby certify that the above is a correct statement of the receipts and disbursements of said society for the year ending December 20, 1885.

R. W. FREEMAN, *President.*
L. B. AGARD, *Secretary.*
DAN. H. MILLS, *Treasurer.*

INGHAM COUNTY FARMERS' CLUB.

HEDGE FENCE OR WIRE?

BY L. W. BAKER, OF DELHI.

Mr. President and Members of the Ingham County Farmers' Club:

The time is already here when we cannot afford to use up our first-class timber in so clumsy a way as to split it into rails.

In one of our meetings last year a member stated that he liked a good rail fence and that laid with a good worm. I think he only voiced the opinion of all. But that is only speculating on an impossibility, as we cannot have such a fence, at the most, but a few years longer, as year after year we see our timber giving way under the greatly increased demand. In view of that fact we begin to look around for the next best material and construction for the future fence. Farmers may expect to be imposed upon with many new devices and patent rights for years to come. Whenever the farmers feel the need of anything there are hordes of those fellows that want to get two dollars out of one and that without work, ready to sell them some worthless article; and many times when they think they are getting just the thing needed, they later find that it is only one more addition to the list of swindles. That whole class are constantly viewing the situation of the farmer and where they see his greatest need there is their strongest hold. As we feel the need of some improved mode of fencing at the present time, I would say, be on the alert and investi-

gate fully and purchase very cautiously any new device whereby they claim they are going to add so much to your wealth and convenience.

Let us look for a moment at the Osage Orange hedge fence as grown by the Dayton Hedge Fence Company of Ohio. Admitting that the hedge fence is desirable, yet untested in this climate to any great extent, would it not be far *better for a few to buy and the rest wait the result? As they claim it only* takes four years to grow a full fence the most of us could afford to wait that length of time for the sake of having it fully tested. Should it prove a failure what a saving it would be! Better wait than act in haste and then repent at leisure. We have the testimony of some good men setting forth its merits and demerits, but none so closely coincides with my views as does that of Professor Beal. Let us see what he says in regard to it:

"In my opinion there are two sides to this question and they should both be well considered before any one in Central Michigan attempts Osage Orange for hedge. This is a southern plant, and although considerably used in certain parts of Michigan, in many places it *kills out badly.* This is the case at the Agricultural College and *in North Lansing.*

"A well grown and well kept hedge presents a fine appearance, but most of our farmers have never tried it, and even after it is well grown by a company, would not likely keep it in good order.

"The roots of the plants, especially after some years, draw considerable from the crops along near the hedge. True, they break the wind and stop the wind in winter and sometimes aid the crops in this way. The farmer should make up his mind quite deliberately and not be too easily persuaded to try a new thing, especially by interested parties, no matter if they do all they promise.

"*Read the following from The Industrialist by Prof. E. M. Shelton, of Kansas agricultural college*: 'A gentleman writes us asking that we aid him in disposing of the considerable stock of Osage Orange hedge plants which he is carrying. The request takes us a good deal by surprise; for, in truth, we have not seen half a mile of new hedge in the last five years. The barb-wire fence has made obsolete the thorny, expensive, ground-consuming, vermin-harboring hedge. About the only man who has anything to say against the barb-wire fence is the unfortunate on horseback, who "brings up" suddenly on a dark night against the sturdy wire.'

"Similar views are entertained by Dr. S. A. Knapp, Professor of Agriculture in Iowa Agricultural College. I have talked with both these men and with many others in various parts of our country, especially where timber is scarce or high in price, and *the opinion is fast gaining ground that the best farm fence is made of a combination* of wire and boards supported by posts, and the wire or band is that with very short tapering barbs. The writer has no interest in this matter, one way or the other, only to serve the interests of the farmers. He gives it as his opinion that in ten years or less, nine out of ten men in this vicinity, who try osage orange grown on any plan will wish they had their money back. I should add that I have been familiar with this patent mode of making hedge for some years."

You see that Professor Beal says that there are two sides to the question. Now, in your opinion, which side would he be likely to take up, for or against the farmers? He being at the head of one department of our State Agricultural College, and that whole institution as a child looking to the people of the State of Michigan for support, and whenever it fails to faithfully serve the people they may withhold their support. I would say in view of the relation he sustains to the people we should weigh well his words of caution.

He says it is a southern plant and kills out badly in some places, even at the college farm.

The professor also presupposes that we would not be likely to keep it in good order. Now this would be for each one to determine for himself. We know our own traits, and whether we have enough pride and energy to properly attend to cultivating and trimming twice a year, or whether our feeble ambition and the pressure of other business would be likely to prevent us from taking a scythe or hook and properly trimming and shaping up our hedge fence first in

June and again in September, two as busy months as we have in the year. Answer these questions, and then,—shall we invest? We often see those who neglect the proper trimming of their orchards, which can and ought to be done in the most leisure months, and on which depends the future value. Would we be more mindful of the hedge?

The close canvassing of the State at the present time looks in itself suspicious while we have timber in abundance compared with many other States. Notice what Professor Shelton of the Kansas Agricultural College says: "He has not seen a mile of new hedge set in the last five years." Kansas is a State destitude of timber compared with Michigan, and still the professor has not seen a mile of new hedge set in five years. Does that signify anything? Does that give any reason for their thus striking Michigan so early? Michigan is about such a State for hedge fence as Kansas would be for saw-mills. Still they are here in preference to western States. Doesn't this speak volumes of caution to us? Let us see what the professor calls it. "The thorny, expensive, ground-consuming, vermin-harboring hedge." The thorns it must certainly have or it would not amount to a fence.

Next, the first cost. It costs $1.00 per rod besides preparing and cultivating the bed and keeping free from weeds for the first few years. This expense depends on the degree of thoroughness with which it is done. The proper trimming, shaping and resetting, if by chance or otherwise the mice should girdle or frost kill, would be the expense of keeping it up. Perhaps I should speak of the ground consumed, which in the aggregate is no small item. From all the testimony before us I feel safe in the assertion that it virtually occupies as much as or more than the common rail fence. That contrasted with the space occupied by post and board or wire fence is worthy of our attention.

Now, if we have got a full fence that will withstand the climate and baffle all others enemies, we have got something that is worth seeking,—a fence for all time, dependent only on our proper care and attention.

I would be glad to draw a true picture of a post and wire fence that I can conceive of. That would be a full looped or woven fence. Why not unroll a coil of fencing, the width being the height, all ready to spike to posts? The posts being set, two men could build more in a day than they could trim of the hedge. Some may say you have got posts that will rot; I would say give yourself no uneasiness, the iron posts will soon be in use. Better use well the privileges and blessings of to-day that more may be added. You may ask, why do you speak of such a fence. Because I believe it to be the coming fence. If such a fence could be manufactured at a reasonable cost, would it not possess more redeeming qualities than any other we have before us to-day? When we look at the improvements in other directions is it unreasonable to suppose that our most sanguine hopes and expectations may be exceeded in this direction? This fence should be of proper height and tight enough to turn all kinds of stock. The first manufacturer that offers such a fence at a reasonable price will step rapidly to the front. I wrote to Messrs. Sedgwick Bros. of Richmond, Ind., manufacturers of wire goods and received sample and price list of a fence that very nearly agrees with my preconceived ideas. It is a wire netting, 4x7 inch mesh and 52 inches wide, that being the height of the fence, which can be bought for $1.05 per rod for 100 rod lots, and less for larger quantities. With our present price for posts cost compares favorably with the cost of any other fence, cheaper than the hedge, and when we pay our money

we have a full fence. On the other hand we have to support our present amount of fence for four years and pay for it two and a half years before we get any returns in usefulness from a hedge fence.

Now we have two leading fences of the day before us, or the two that are being introduced, for us to pass judgment on or choose between. The one a full wire, sufficiently tight to turn all kinds of stock, one that will need little or no care for years, one that is ornamental as well as useful and that without continual care.

With my means of judging I should much prefer the wire. How could we live up to the old saying, "When a task is once begun, never leave it till its done," with the hedge?

REGISTER OF

METEOROLOGICAL OBSERVATIONS

FOR THE YEAR 1885,

TAKEN AT THE

STATE AGRICULTURAL COLLEGE OF MICHIGAN,

BY R. C. KEDZIE,

PROF. OF CHEMISTRY.

LATITUDE 42° 43′ 56″; LONGITUDE 7° 25′ 59″ WEST OF WASHINGTON.

HEIGHT ABOVE THE SEA, 834 FEET.

Meteorological Observations for

Day of Month.	Thermometer, in Open Air. 7 A. M.	2 P. M.	9 P. M.	Daily Mean.	Relative Humidity, or Per Cent of Saturation. 7 A. M.	2 P. M.	9 P. M.	Barometer, Reduced to Freezing Point. 7 A. M.	2 P. M.	9 P. M.	Mean.
1	14	19	10	14⅓	100	85	100	29.137	29.204	29.424	29.255
2	8	15	8	10⅓	100	100	100	29.592	29.502	29.564	29.513
3	*11*	*22*	*10*	*17⅔*	*80*	*72*	*85*	*29.483*	*29.415*	*29.378*	*29.429*
4	24	30	27	27	87	78	88	29.330	29.268	29.154	29.251
5	28	40	36	34⅔	88	65	90	29.010	28.971	28.815	28.932
6	41	39	33	37⅔	91	82	100	29.280	29.255	29.371	29.302
7	31	37	31	33	89	55	89	28.731	28.828	28.989	28.840
8	31	43	38	37⅓	100	67	91	28.844	28.732	28.718	28.768
9	33	34	25	30⅔	89	70	75	28.729	28.902	29.058	28.896
10	17	30	28	25	100	89	88	29.400	29.280	29.029	29.236
11	35	37	38	36⅔	61	100	100	28.785	28.650	28.514	28 650
12	24	33	8	31⅔	87	100	78	28.775	28.992	29.293	29.020
13	5	12	8	8⅓	100	61	100	29.493	29.553	29.544	29.530
14	11	20	20	17	80	85	85	29.553	29.497	29.301	29.452
15	20	23	19	20⅔	85	86	100	29.327	29.292	29.254	29.291
16	13	17	8	12⅔	100	83	100	29.129	29.005	28.727	28.954
17	15	16	4	11⅔	100	83	100	28.937	29.171	29.337	29.148
18	-7	6	-4	-1⅔	100	100	100	29.371	29.377	29.455	29.301
19	-16	4	-9	-7	100	100	100	29.460	29.442	29.418	29.440
20	-8	4	3	-⅓	100	100	100	29.238	29.135	29.043	29.139
21	0	7	-6	⅓	100	77	100	29.027	29.165	29.404	29.199
22	*-11*	*8*	4	*0*	*100*	*78*	*100*	*29.502*	*29.310*	*29.016*	*29.215*
23	6	18	25	16⅓	100	80	100	28.880	28.800	28.789	28.823
24	26	31	25	27⅓	88	89	100	28.798	28.788	28.811	28.799
25	20	19	10	16⅓	85	85	79	28.893	28.855	28.778	28.842
26	4	7	-8	-1	100	100	100	28.834	28.965	29.038	28.946
27	-10	2	-3	-3⅔	100	100	100	29.138	29.085	29.082	29.102
28	-22	8	-11	-8⅓	100	100	100	29.160	29.173	29.261	29.198
29	-7	9	12	4⅔	59	78	80	29.276	29.282	29.217	29.258
30	20	29	5	18	85	78	80	29.144	29.206	29.274	29.208
31	9	27	26	20⅔	100	76	80	29.273	29.130	28.918	29.107
Sums											
Means				15.84	92	84	93				29.144
Average						90					

the Month of January, 1885.

Clouds.						Winds.						Registering Thermometer.		Rain and Snow.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.							
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Maximum.	Minimum.	Beginning Rain or Snow.	Ending Rain or Snow.	Inches of Rain or Melted Snow.	Depth of Snow, Inches.
80	St.	90	Cu. St.	00	....	w	8	n w	16	n w	4	20	3	....	....	.....	.....
60	St.	50	Cir.Cu.	00	....	....	0	w	8	....	0	15	6	....	....	.....	.....
100	St.	100	St.	70	St.	s	4	s	8	s	4	24	11	....	....	.....	.....
90	St.	20	St.	00	....	s w	12	s w	12	w	16	30	24	....	....	.....	.....
10	St.	100	St.	100	St.	s	12	s	8	s e	6	41	28	....	....	.....	.....
100	Nim.	100	Nim.	100	Nim.	s	12	s w	20	s w	8	42	30	In night.	10 p.m.	.50	.....
100	St.	20	Cir.Cu.	100	St.	w	16	s w	20	w	8	37	29	....	....	.....	.....
100	St.	10	Cir.	00	....	s	6	s w	12	s w	12	41	31	....	....	.....	.....
30	St.	60	Cir.Cu.	00	....	w	8	n w	20	w	24	38	17	....	....	.....	.....
00	....	80	Cir. St.	100	St.	w	2	s w	8	s	4	35	17	....	....	.....	.....
100	St.	100	Nim.	100	Nim.	s	6	s	6	s	4	38	23	1 p.m.	12 m.	.40	½
100	St.	90	St.	30	St.	s w	16	s w	20	w	12	33	4	....	....	.....	.....
100	St.	100	St.	20	St.	n w	2	s w	12	s w	8	12	5	....	....	.....	.....
100	St.	70	St.	100	Nim.	s w	6	w	2	n e	8	22	10	....	....	.....	.....
100	St.	100	St.	100	Cir. St.	n e	8	n e	8	....	0	23	12	....	....	.....	.....
100	St.	100	St.	100	Nim.	n e	4	n e	16	n e	20	17	3	4 p.m.	....	.....	.....
100	St.	100	St.	100	St.	n	20	n w	20	w	16	18	-8	....	7 a.m.	1.10	11
100	St.	100	Nim.	100	St.	s w	8	s w	16	s w	12	5	-17	....	....	.....	.....
70	St.	80	Cir. St.	00	....	s w	6	s w	16	s w	12	4	-16	....	....	.....	.....
100	St.	10	St.	100	St.	s w	12	s w	20	s w	16	4	-8	....	....	.....	.....
100	St.	40	Cu. St.	00	....	s w	6	w	16	w	4	10	-18	....	....	.....	.....
100	St.	00	....	100	St.	s w	2	w	8	....	0	8	-11	....	....	.....	.....
100	St.	100	Nim.	100	Nim.	s	12	s	4	s e	2	25	5	10 a.m.	....	.....	.....
100	St.	100	St.	100	St.	....	0	s w	12	s w	4	31	19	....	7 a.m.	.60	6
80	St.	00	....	20	St.	w	12	s w	16	s w	16	25	4	....	....	.....	.....
80	St.	100	Nim.	50	....	w	16	s w	16	w	3	8	-14	....	....	.....	.....
100	St.	100	St.	100	Nim.	....	0	n e	4	n e	4	2	-22	....	....	.....	.....
40	St.	100	Nim.	00	....	s w	3	s w	16	....	0	8	-22	....	....	.....	.....
100	St.	90	Cu. St.	100	Nim.	s	12	s w	16	s	8	20	-7	7 p.m.	12 m.	.10	1
100	St.	100	St.	100	Fog.	s	1	w	12	s w	1	29	-3	....	....	.....	.....
100	St.	100	St.	100	Nim.	....	0	s	4	s	12	29	9	....	....	.....	.....
														....	....	2.70	18½
86	....	75	....	64	....	....	....	....	....	....	....	22.42	4.64	....	....	.....	.....

75

Meteorological Observations for

Day of Month.	Thermometer, in Open Air. 7 A. M.	2 P. M.	9 P. M.	Daily Mean.	Relative Humidity, or Per Cent of Saturation. 7 A. M.	2 P. M.	9 P. M.	Barometer, Reduced to Freezing Point. 7 A. M.	2 P. M.	9 P. M.	Mean.
1	13	15	0	9⅓	81	65	100	29.101	29.258	29.341	29.233
2	-3	10	10	7⅓	100	100	100	29.264	29.003	28.928	29.065
3	24	34	25	27⅔	100	79	100	28.824	28.662	28.557	28.681
4	30	34	24	29⅓	100	90	87	28.395	28.434	28.624	28.484
5	8	7	-10	1⅔	100	100	100	28.723	28.827	29.017	28.856
6	-13	10	6	1	100	58	100	28.064	28.983	28.990	29.012
7	9	21	16	15⅓	100	86	100	28.994	28.882	28.781	28.886
8	5	20	15	13⅓	100	70	100	29.069	29.150	29.130	29.123
9	12	13	3	9⅓	100	100	100	28.798	28.434	28.489	28.574
10	-9	-1	-15	-8⅓	100	100	100	28.666	28.742	28.909	28.772
11	-22	3	-4	-9⅔	100	100	100	28.963	28.984	28.952	28.966
12	2	6	-3	1⅔	100	100	100	28.920	29.040	29.115	29.025
13	-18	6	-10	-7⅓	100	76	100	29.113	29.067	29.068	29.079
14	-14	20	16	7⅓	100	41	100	28.981	28.908	28.910	28.932
15	20	32	33	28⅓	100	79	89	28.824	28.607	28.537	28.656
16	-6	-6	-16	-9⅓	100	100	100	28.630	28.829	28.870	28.843
17	-15	5	2	-2⅔	100	75	100	28.992	28.942	28.960	28.965
18	-14	14	-3	-1	100	64	100	29.065	29.107	29.171	29.114
19	-8	10	4	-⅔	100	79	100	29.123	29.027	29.132	29.091
20	-9	10	4	-1	100	79	100	20.184	29.210	29.265	29.217
21	-8	11	2	1⅔	100	80	100	29.272	29.291	29.315	29.293
22	-7	19	6	6	100	85	100	29.327	29.385	29.471	29.394
23	-13	21	5	4⅓	100	71	100	29.532	29.536	29.461	29.510
24	10	33	13	18⅔	79	51	100	29.372	29.265	29.222	29.286
25	4	31	12	19	100	38	100	29.214	29.177	29.181	29.191
26	23	34	28	28⅓	86	79	100	29.065	28.975	28.967	29.002
27	20	36	26	27⅓	100	61	100	28.962	29.020	29.168	29.046
28	31	44	35	36⅔	79	60	90	28.962	28.798	28.807	28.856
29											
30											
31											
Sums											
Means				8°.04	97	77	99				.29.005
Average						91					

the Month of February, 1885.

Clouds						Winds						Registering Thermometer		Rain and Snow			
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.							
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Maximum.	Minimum.	Beginning Rain or Snow.	Ending Rain or Snow.	Inches of Rain or Melted Snow.	Depth of Snow, Inches.
90	St.	00	....	10	St.	n	12	s w	16	w	8	20	10				
100	Nim.	100	St.	100	St.	s	8	s	12	s e	1	24	-3	In night.		.10	1½
100	Nim.	100	St.	00	....	s	6	s	4	....	0	35	24				
100	Nim.	100	St.	100	St.	s w	16	w	8	w	8	35	8	6 a.m.	9 a.m.	.05	¼
100	St.	40	Cu. St.	00	....	n	8	n	8	....	0	10	-18				
10	St.	100	St.	100	Nim.	e	2	s	6	s e	6	11	-13	7 p.m.	10 p.m.	.03	1
100	St.	100	Nim.	100	Nim.	s e	4	s e	8	s e	6	21	3	1 p.m.	10 p.m.	.41	5
10	St.	20	St.	100	St.	....	0	n	2	e	8	22	5				
100	Nim.	100	Nim.	00	....	n e	12	n	12	n w	20	13	-9	In ni't.	7 p.m.		
30	St.	60	St.	00	....	w	12	w	24	w	20	2	-24				
00	....	30	St	00	....	s w	16	s w	20	s w	16	2	-22				
100	St.	60	St.	40	St.	s w	8	w	12	s w	8	9	-19				
00	....	90	St.	00	....	s w	1	s	8	....	0	7	-22				
90	St.	00	....	100	St.	s e	6	s	8	....	0	20	-14				
80	St.	100	Nim.	100	Nim.	s	12	s e	16	s e	16	34	-7	2 p.m.	10 p.m.	.14	1½
10	St.	30	St.	00	....	s w	12	s w	16	s w	12	-6	-18				
00	....	10	St.	100	St.	s w	8	s w	6	s w	4	5	-15				
00	....	80	Cu.	00	....	s w	2	w	16	w	6	16	-14				
90	St.	50	Cu. St.	00	....	s w	8	w	12	w	12	14	-10				
10	St.	40	Cu. St.	00	....	s w	6	w	12	....	0	10	-14				
90	St.	00	....	00	....	s w	3	w	4	....	0	11	-14				
20	St.	10	St.	00	....	s w	4	w	8	w	3	19	-14				
10	St.	00	....	00	....	s w	1	s	1	....	0	22	-13				
100	St.	60	Cir. St.	70	Cir. Cu.	s e	1	e	1	....	0	35	1				
10	St.	00	....	30	Cir. Cu.	....	0	e	1	....	0	31	13				
100	St.	100	St.	20	St.	s e	4	s	4	....	0	38	19				
10	St.	00	....	100	St.	s w	3	w	2	....	0	37	19				
20	St.	100	St.	100	St.	s	6	s w	12	s w	8	45	30				
																.73	9¼
53	....	53	....	42	....							19.39	-5.75				
		49															

Meteorological Observations for

Day of Month.	Thermometer, in Open Air.				Relative Humidity, or Per Cent of Saturation.			Barometer, Reduced to Freezing Point			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	33	36	23	30⅔	89	80	88	28.753	28.747	28.880	28.793
2	15	28	27	23⅓	100	88	100	28.988	29.006	28.910	28.968
3	32	37	34	34⅓	89	90	90	28.615	28.640	28.747	28.667
4	33	33	29	31⅔	89	70	89	28.898	29.077	29.175	29.051
5	24	36	24	28	100	61	100	29.291	29.292	29.285	29.289
6	24	32	25	27	100	79	100	29.315	29.258	29.161	29.245
7	15	29	0	14⅔	85	78	100	29.090	29.170	29.245	29.168
8	10	27	7	14⅔	100	76	100	29.314	29.327	29.305	29.315
9	23	35	32	30	86	70	59	29.063	28.967	29.030	29.020
10	12	24	11	14⅓	100	70	100	29.190	29.402	29.452	29.348
11	9	28	15	17⅓	100	77	100	29.376	29.252	29.143	29.257
12	23	19	7	16⅓	100	85	100	29.173	29.278	29.341	29.264
13	8	27	23	16⅔	100	100	100	29.196	29.163	29.135	29.165
14	25	40	30	31⅔	100	100	89	28.940	28.529	28-482	28.650
15	22	22	12	18⅔	72	100	100	28.780	28.860	28.900	28.847
16	0	8	-2	2	100	100	100	29.228	29.149	29.352	29.343
17	-7	11	9	4⅓	100	80	100	29.367	29.264	29.133	29.255
18	15	22	7	14⅔	100	72	100	28.858	28.867	28.987	28.904
19	1	13	2	5⅓	100	62	100	28.982	28.912	29.000	28.965
20	-7	6	0	-⅓	100	76	100	29.112	29.148	29.185	29.148
21	-6	12	1	2⅓	100	61	100	29.261	29.238	29.271	29.257
22	1	15	12	9⅓	100	82	100	29.310	29.292	29.288	29.297
23	2	26	17	15	100	75	100	29.305	29.263	29.209	29.259
24	28	36	19	27⅔	88	45	85	29.031	29.098	29.258	29.129
25	10	28	26	21⅓	100	43	75	29.313	29.195	29.110	29.206
26	30	44	40	38	78	60	73	29.012	28.922	28.890	28.941
27	37	39	30	35⅓	61	64	78	28.847	28.910	29.022	28.926
28	25	37	27	29⅔	87	63	88	29.072	29.090	29.100	29.087
29	20	31	25	25⅓	100	89	87	29.267	29.239	29.211	29.239
30	30	36	30	32	100	100	89	28.916	28.847	29.052	28.939
31	40	44	31	35	65	60	89	28.930	29.044	29.178	29.051
Sums											
Means				21°.26	94	76	93				29.096
Average				[illegible]		88					

the Month of March, 1885.

Clouds.						Winds.						Registering Thermometer.		Rain and Snow.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.							
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Maximum.	Minimum.	Beginning Rain or Snow.	Ending Rain or Snow.	Inches of Rain or Melted Snow.	Inches of Snow, Inches.
100	St.	100	St.	100	St.	w	12	w	16	w	12	39	13	....	....	....	....
00	....	10	St.	100	Nim.	w	8	w	8	n w	8	31	25	8 p.m.	10 p.m.	.10	1
100	St.	100	Nim.	100	Nim.	s	12	s w	16	s w	16	40	32	9 a.m.	12 p.m.	....	....
100	St.	100	St.	100	St.	w	16	w	12	....	6	34	22	....	....	....	....
90	Cir.Cu.	20	Cir.Cu.	100	St.	n e	6	n	0	....	0	36	22	....	....	....	....
100	St.	90	Cu. St.	100	Nim.	n e	8	n e	8	n e	8	32	12	6 p.m.	Night.	....	4
10	Cir.Cu.	20	Cir.Cu.	00	....	s e	4	s e	8	n e	2	30	-5	....	....	....	....
00	....	30	Cir.Cu.	00	....	....	0	s w	12	....	0	20	7	....	....	....	....
100	St.	00	Cir.Cu.	00	....	s w	24	s w	28	....	0	37	10	....	....	....	....
00	....	00	....	00	....	....	0	....	0	....	0	20	3	....	....	....	....
10	Cir.	10	Cir.	00	....	s e	8	s e	8	s e	2	30	10	....	....	....	....
100	St.	100	St.	100	St.	n e	8	n e	12	n e	6	23	1	....	....	....	....
100	Nim.	100	St.	100	St.	s w	3	s w	8	s w	2	40	10	....	....	....	....
100	St.	100	Nim.	100	Nim.	s e	8	s w	20	s w	28	40	10	11 a.m.	1 p.m.	.25	....
60	Cir.Cu.	60	Cir. St.	100	Cir. St.	n w	20	n w	16	n w	1	23	-4	....	....	....	....
90	Cn. St.	10	Cu.	00	....	....	0	w	16	....	0	9	-13	....	....	....	....
00	....	15	Cir. St.	90	St.	s w	1	w	8	w	12	15	-7	....	....	....	....
100	Nim.	100	St.	90	St.	s	1	n w	16	w	8	26	-3	7 a.m.	9 a.m.	.03	¼
00	....	50	Cu.	20	Cir.	w	1	w	16	n	12	16	-11	....	....	....	....
00	....	20	Cir.	00	....	n w	8	w	12	....	0	6	-12	....	....	....	....
00	....	10	Cu.	00	....	w	4	n w	8	....	0	12	-6	....	....	....	....
00	....	5	Cu.	50	Cir.Cu.	n e	6	n e	8	w	6	17	-3	....	....	....	....
00	....	20	St.	00	....	s w	6	w	20	w	16	28	2	....	....	....	....
100	Nim.	90	Cu. St.	00	....	s w	24	w	16	n w	6	38	4	7 a.m.	....	....	....
00	....	20	Cir. St.	100	St.	s e	6	w	16	s w	8	31	10	....	....	....	....
100	St.	10	Cir.	100	St.	s w	8	s w	16	s w	16	44	30	....	....	....	....
100	St.	90	St.	70	St.	s w	6	w	8	w	8	40	19	....	....	....	....
60	Cir. St.	60	Cir.Cu.	100	St.	e	6	s w	2	....	0	40	19	....	....	....	....
30	St.	20	Cu.	00	....	n e	8	s w	2	s	4	32	20	....	....	....	....
100	Nim.	100	Nim.	00	....	s e	12	s w	16	s w	6	40	28	5 a.m.	4 p.m.	.20	2
70	Cu. St.	20	Cu.	00	....	s w	12	w	16	....	0	44	28	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.58	7¼
55	....	48	....	52	....	....	....	....	....	....	....	29°.74	8°.81	....	....	....	....

52

Meteorological Observations for

Day of Month.	Thermometer, in Open Air.				Relative Humidity, or Per Cent of Saturation.			Barometer, Reduced to Freezing Point.			
	7 A. M.	2 P. M.	9 P. M.	*Daily Mean.*	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	33	42	27	34	79	50	88	29.340	29.371	29.325	29.345
2	29	35	30	31⅓	89	90	89	29.045	28.947	29.037	29.009
3	24	32	24	26⅔	100	79	87	29.128	29.160	29.195	29.161
4	25	42	31	33⅔	75	58	79	29.152	29.072	28.977	29.033
5	38	55	40	44⅓	72	50	56	28.793	28.600	28.892	28.771
6	33	52	40	41⅔	79	41	39	29.188	29.161	29.092	29.147
7	46	54	54	51⅓	92	74	100	28.926	28.828	28.785	28.643
8	27	35	25	29	88	53	100	29.078	29.199	29.311	29.196
9	27	34	25	28⅔	88	61	100	29.321	29.401	29.198	29.306
10	27	43	35	35	88	43	70	29.125	28.955	28.750	28.943
11	33	35	31	33	100	90	100	28.494	28.622	28.800	28.688
12	32	40	30	34	89	65	89	28.920	28.955	29.027	28.967
13	25	32	25	25⅔	87	89	75	29.186	29.248	29.351	29.261
14	28	31	29	27⅔	88	89	100	29.375	29.293	29.176	29.281
15	34	44	35	38	100	84	90	28.982	28.932	29.037	28.983
16	34	45	37	38⅔	100	61	81	29.125	29.142	29.138	29.135
17	35	47	42	41⅓	61	41	66	29.117	29.127	29.092	29.112
18	41	57	48	48⅔	74	41	56	29.168	29.210	29.328	29.235
19	45	66	56	55⅔	76	50	81	29.421	29.416	29.391	29.409
20	57	75	61	64⅓	69	44	66	29.396	29.318	29.281	29.331
21	63	78	62	67⅔	67	43	61	29.271	29.198	29.188	29.219
22	61	79	67	69	66	43	60	29.118	29.040	29.060	29.072
23	63	77	61	67	67	38	82	29.062	28.977	29.045	29.103
24	45	57	41	47⅔	92	52	91	29.141	29.203	29.271	29.205
25	42	58	44	48	74	32	92	29.251	29.052	28.935	29.079
26	41	61	47	49⅔	91	45	70	28.911	28.987	29.139	29.012
27	45	62	46	51	84	56	54	29.210	29.158	29.085	29.157
28	48	45	34	42⅓	85	61	79	28.785	29.019	29.176	28.993
29	40	60	51	30⅓	82	34	46	29.153	29.025	28.963	29.047
30	50	55	43	49⅓	72	68	100	28.935	28.927	28.912	28.931
31											
Sums											
Means				$43^{\circ}.59$	82	58	78				29.097
Average					73						

the Month of April, 1885.

Clouds.						Winds.						Registering Thermometer.		Rain and Snow.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.							
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Maximum.	Minimum.	Beginning Rain or Snow.	Ending Rain or Snow.	Inches of Rain or Melted Snow.	Depth of Snow, Inches.
10	St.	40	Cir. St.	00		w	6	e	3	e	6	43	28				
100	St.	100	Nim.	100	Cu. St.	e	6	n	4	n e	12	35	24	8 a.m.	3 p.m.	.05	
100	St.	50	St.	00		n e	16	n	16	e	2	32	17				
00		00		100	St.	n w	8	w	12	w	4	42	25				
90	Cu. St.	20	Cu. St.	00		s	12	w	20		0	55	28				
20	St.	00		00		s w	2	s e	8	s e	12	54	33				
100	Cu. St.	100	Cu. St.	100	Nim.	s e	8	s	16	s w	16	56	27				
100	St.	30	Cu.	10	St.	w	24	n w	16		0	36	21	8 p.m.	10 p.m.	.37	
100	St.	100	St.	00		e	4	e	5		0	37	21				
20	St.	00		100	St.	s	2	s	4	s	2	45	27				
100	Nim.	100	Nim.	100	Nim.	w	4	w	16		0	35	30	In night.	10 p.m.	.54	4
100	St.	50	Cu. St.	100	St.	n w	8	n w	8	w	10	41	23				
100	St.	40	Cu.	00		n w	5	n w	16		0	35	19				
100	St.	100	Nim	100	Nim.	s e	4	s e	8	s e	4	34	19	10 a.m.			
100	Nim.	100	St.	100	St.	s e	6	n e	6	e	4	48	34		9 a.m.	.50	4
100	St.	100	St.	50	St.	e	6	n e	12	e	8	45	31				
100	St.	100	St.	100	St.	e	12	e	12	e	12	48	36				
100	St.	50	Cir. St.	100	St.	e	12	n e	12	e	8	58	41				
100	St.	50	Cu. St.	90	St.	e	6	s e	8		0	67	45				
30	Cir. Cu.	40	Cu.	00		s	8	s	12		0	75	57				
40	St.	10	Cu.	00		s	12	s w	16	s w	8	78	55				
10	St.	70	Cu.	80	Cu. St.	s	12	s	16	s	12	79	52				
30	St.	90	Cu. St.	100	Nim.	s	12	s w	16	s w	8	81	45	6 p.m.	10 p.m.	.05	
100	St.	40	Cu.	00		n w	12	n w	8		0	58	34				
00		60	Cir. St.	100	Nim.	e	8	e	12	e	6	58	37	7 p.m.	10 p.m.	.54	
30	Cu.	70	Cu.	00		w	12	w	16	w	8	61	37				
30	St.	30	Cu.	10	Cir.	n w	3	s w	4	s e	8	62	42				
100	Nim.	100	Cu. St.	00		n w	16	n	16		0	48	29				
00		00		100	St.	s w	12	s w	16	s w	8	61	39				
100	St.	100	Nim.	100	Nim.		0	e	4	e	8	57	30	1 p.m.	10 p.m.	.42	
																2.47	8
67		58		54								52°.13	33°.16				
		60															

Meteorological Observations for

Day of Month.	Thermometer, *in Open Air.*				Relative Humidity, or Per Cent of Saturation.			Barometer, Reduced to *Freezing Point.*			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	42	55	45	47⅓	66	33	84	28.877	28.922	29.020	28.939
2	40	51	37	42⅔	56	28	38	29.111	29.112	29.158	29.127
3	38	50	42	43⅓	45	58	74	29.083	28.927	28.947	28.985
4	45	57	46	49⅓	61	41	47	28.978	28.970	28.892	28.946
5	57	64	55	58⅔	81	73	100	28.715	28.629	28.677	28.770
6	44	44	42	43⅓	100	100	100	28.698	28.667	28.648	28.67I
7	38	42	35	38⅓	63	50	61	28.778	28.777	28.931	28.828
8	37	44	33	38	71	52	89	28.818	28.735	28.738	28.767
9	37	45	37	39⅔	72	53	81	28.798	28.737	28.902	28.812
10	38	44	31	37⅔	81	52	89	28.945	28.967	29.045	28.985
11	35	54	42	43⅔	61	49	66	29.133	29.122	29.112	29.122
12	44	64	46	51⅓	84	39	84	29.092	29.087	29.110	29.096
13	48	69	52	56⅓	85	48	41	29.163	29.145	29.158	29.155
14	53	73	54	60	80	31	61	29.213	29.191	29.213	29.205
15	58	76	56	63⅓	64	27	63	29.246	29.225	29.183	29.218
16	64	79	65	69⅓	58	27	49	29.196	29.128	29.087	29.137
17	69	81	67	72⅓	43	26	46	29.042	28.959	28.927	28.976
18	68	80	47	65	80	31	84	28.942	28.932	28.967	28.947
19	44	48	47	46⅓	84	78	84	29.032	29.181	29.138	29.117
20	46	75	60	60⅓	92	56	77	29.131	29.082	29.122	29.111
21	61	80	67	69⅓	71	51	60	29.176	29.112	29.095	29.127
22	61	73	62	65⅓	68	67	88	29.122	29.077	29.067	29.088
23	60	77	65	67⅓	94	65	84	29.115	29.072	29.060	29.082
24	70	64	64	66	75	94	94	29.038	28.935	28.895	28.956
25	65	70	59	64⅔	89	61	65	28.843	28.940	29.055	28.946
26	59	78	58	65	82	36	76	29.103	29.082	29.092	29.092
27	56	71	54	60⅓	63	49	74	29.182	29.156	29.168	29.168
28	51	72	62	61⅔	65	85	51	29.187	29.118	29.008	29.104
29	56	61	59	58⅔	63	94	94	28.908	28.845	28.868	26.873
30	59	67	58	61⅓	94	79	94	28.705	28.732	28.760	28.752
31	59	73	56	62⅔	86	50	87	28.818	28.830	28.865	28.837
Sums											
Means				55°.76	74	54	74				28.99
Average	[illegible]				67						

the Month of May, 1885.

Clouds.						Winds.						Registering Thermometer.		Rain and Snow.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.							
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Maximum.	Minimum.	Beginning Rain or Snow.	Ending Rain or Snow.	Inches of Rain or Melted Snow.	Depth of Snow, Inches.
20	St.	50	Cu.	100	St.	n e	8	n e	8	e	4	56	39	....	....	....	....
70	St.	10	St.	00	....	n	3	n w	12	n	4	52	20	....	....	....	....
100	St.	100	Cu. St.	30	St.	s	2	s w	8	w	4	51	35	....	....	....	....
30	St.	30	Cu.	10	St.	w	8	w	8	s	8	58	44	....	....	....	....
100	Cu. St.	100	Cu. St.	100	Nim.	s w	16	s w	16	s w	8	66	43	4 p.m.	....	....	....
100	Nim.	100	Nim.	100	Nim.	n	6	n e	8	n e	6	44	34	....	10 p.m.	1.00	....
30	Cu.	50	Cu.	00	....	s w	20	s w	28	s w	16	43	34	....	....	....	....
100	St.	100	St.	100	Nim.	s w	16	s w	20	s w	16	44	32	3 p.m.	10 p.m.	.30	....
100	Cu. St.	80	Cu.	20	St.	w	16	w	20	w	16	45	31	Snow s	qualls.		
100	St.	100	St.	00	....	w	12	w	12	....	0	45	31	....	....	....	....
00	....	10	Cu.	20	Cu. St.	n e	3	s w	1	....	0	58	36	....	....	....	....
50	St.	70	Cu. St.	00	....	....	0	w	1	....	0	66	36	....	....	....	....
00	....	40	Cu.	00	....	s w	1	e	3	....	0	69	41	....	....	....	....
00	....	30	Cu.	00	....	s w	3	s	2	....	0	74	42	....	....	....	....
00	....	00	....	00	....	s w	4	s w	12	....	0	76	49	....	....	....	....
00	....	20	Cir.	00	....	s	1	s	6	....	0	79	53	....	....	....	....
00	Cir.	10	Cir.	30	St.	s w	2	s	12	s	8	81	60	....	....	....	....
00	....	60	Cu.	00	....	s w	12	s w	12	n w	8	80	42	....	....	....	....
100	Nim.	100	St.	80	Cu. St.	e	6	n e	8	....	0	48	35	....	....	....	....
10	St.	20	Cu.	10	Cir.	....	0	s	4	s	1	75	46	....	....	....	....
100	Hazy.	100	Cu. St.	100	St.	n e	3	n e	6	e	3	80	59	....	....	....	....
100	Nim.	100	Cu. St.	00	....	e	1	e	4	....	0	75	57	7 a.m.	10 a.m.	.10	....
100	Fog.	80	Cu. St.	90	Cu. St.	e	3	s e	4	....	0	78	57	....	....	....	....
30	Cir.Cu.	100	Nim.	100	Cu. St.	s	4	s w	12	s	8	85	62	1 p.m.	3 p.m.	.45	....
100	Cu. St.	60	Cu. St.	00	....	s w	18	w	16	w	2	75	52	....	....	....	....
80	Cir.Cu.	20	Cir. St.	80	Cu. St.	s w	4	s w	8	....	0	78	51	....	....	....	....
40	Cir.	....	Haze.	50	St.	w	4	n e	6	n e	4	72	46	....	....	....	....
90	Cir.Cu.	40	Cir.Cu.	100	Cu. St.	n e	6	e	8	s e	6	74	52	....	....	....	....
100	St.	100	Nim.	100	Nim.	e	3	e	6	e	3	61	56	9 a.m.	....	....	....
100	Nim.	100	Cu. St.	100	St.	s e	1	n	4	e	1	70	56	....	10 a.m.	.45	....
100	St.	70	Cu. St.	00	....	n w	8	w	8	....	0	76	46	....	....	....	....
														....	....	2.30	....
60	....	62	....	43	....	....	....	....	....	....	....	65°.31	44°.51	....	....	....	....

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Meteorological Observations fo

Day of Month.	Thermometer, in Open Air.				Relative Humidity, or Per Cent of Saturation.			Barometer, Reduced to Freezing Point.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	60	74	64	66	65	43	73	28.973	28.947	29.042	28.98
2	56	75	65	65⅓	87	52	63	29.138	29.122	29.105	29.12
3	*60*	*74*	*63*	*65⅔*	*100*	*40*	*100*	*29.023*	*28.980*	*28.960*	*28.98*
4	62	67	60	63	94	95	100	28.952	28.872	28.720	28.84
5	57	69	56	60⅔	100	61	87	28.860	28.992	29.040	28.96
6	61	76	66	67⅔	77	41	74	29.101	29.087	28.898	29.02
7	74	84	60	72⅔	81	61	100	28.837	28.772	28.830	28.81
8	46	58	46	50	100	64	77	28.932	29.018	29.143	29.03
9	50	67	47	54⅔	65	46	92	29.296	29.266	29.284	29.28
10	52	71	57	60	86	49	81	29.329	29.376	29.288	29.33
11	59	75	64	66	88	52	73	29.299	29.235	29.208	29.24
12	67	83	70	73⅓	84	53	80	29.125	29.057	29.022	29.06
13	70	81	67	72⅔	75	55	84	28.832	28.872	28.942	28.88
14	70	85	74	76⅓	80	51	72	29.055	29.032	28.997	29.02
15	72	81	70	74⅓	85	70	85	28.965	28.937	29.004	28.90
16	58	68	55	60⅓	64	64	74	29.151	29.191	29.193	29.16
17	56	70	55	60⅓	81	48	81	29.234	29.206	29.218	29.21
18	57	76	60	71	81	70	82	29.292	29.273	29.283	29.28
19	62	79	65	68⅔	77	47	78	29.304	29.255	29.185	29.24
20	65	72	64	67	73	85	94	29.048	28.942	28.982	28.99
21	70	66	52	62⅔	85	95	86	28.912	28.802	28.073	28.91
22	46	61	46	51	77	50	92	29.202	29.184	29.232	29.20
23	53	71	53	59	80	77	80	29.252	29.244	29.293	29.26
24	54	73	58	61⅔	87	55	94	29.336	29.305	29.295	29.31
25	63	76	63	67⅓	78	56	94	29.273	29.223	29.198	29.23
26	67	83	65	71⅔	84	53	100	29.191	29.134	29.115	29.14
27	73	80	70	77⅔	85	78	95	29.085	29.047	28.982	29.01
28	71	72	57	66⅔	90	70	87	28.977	29.012	29.128	29.03
29	52	65	57	58	86	49	69	29.241	29.238	29.274	29.25
30	53	68	57	59⅓	73	38	87	29.309	29.246	29.201	29.25
31											
Sums											
Means				64°.69	82	59	84				29.10
Average				[illegible]		75					

the Month of June, 1885.

Clouds.						Winds.						Registering Thermometer.		Rain and Snow.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.							
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Maximum.	Minimum.	Beginning of Rain or Snow.	Ending Rain or Snow.	Inches of Rain or Melted Snow.	Depth of Snow, Inches.
10	St.	20	Cu.	00	....	n	4	n w	8	....	0	76	44	....	....	.....	.....
00	....	60	Cir. St.	80	Cir. St.	n	4	s e	4	n e	6	79	56	....	....	.....	.....
100	Cu. St.	50	Cir. St.	100	St.	e	8	e	6	....	0	72	60	1 a.m.	....	.56	.....
100	Fog.	100	Nim.	100	Nim.	....	0	n e	8	e	4	73	56	....	....	1.36	.....
100	Nim.	60	Cu. St.	00	....	n e	8	n e	8	....	0	70	49	....	8 a.m.	.26	.....
70	Cir.Cu.	30	Cir.Cu.	00	....	s	6	s	8	s	8	76	62	....	....	.....	.....
10	Cir.Cu.	30	Cu.	100	Nim.	s w	8	s w	6	s	2	85	46	6 p.m.	....	.....	.....
100	Nim.	20	Cu.	00	....	n e	5	n	8	....	0	62	40	....	9 a.m.	1.00	.....
00	....	30	Cu.	00	....	n w	2	n w	6	....	0	69	43	....	....	.....	.....
20	Cir.	10	Cir.	00	....	w	3	s	4	....	0	73	48	....	....	.....	.....
20	St.	10	St.	00	....	s	4	s w	6	....	0	78	57	....	....	.....	.....
10	Cir.	60	Cir. St.	00	....	s	8	s w	8	s	4	85	65	....	....	.....	.....
90	St.	60	Cu. St.	00	....	s	8	s w	12	w	4	81	60	....	....	.....	.....
10	Cir. St.	10	Cir. St.	20	St.	s w	1	s e	4	s e	3	86	69	....	....	.....	.....
90	Nim.	100	Nim.	100	Cir. St.	s	8	s w	12	....	0	81	57	9 a.m.	11 a.m.	.52	.....
100	St.	40	Cir. St.	00	....	n	1	s w	4	n w	2	71	45	....	....	.....	.....
00	....	80	Cu. St.	00	....	w	3	w	12	w	1	72	48	....	....	.....	.....
00	....	30	Cu.	00	....	s w	4	s	8	....	0	76	52	....	....	.....	.....
00	....	40	Cu.	100	St.	s w	8	s	8	s w	6	80	60	....	....	.....	.....
100	Nim.	80	Cu. St.	20	St.	s e	8	s	12	w	2	76	57	7 a.m.	9 a.m.	.05	.....
100	St.	100	Nim.	100	Nim.	s	6	n	2	n	12	80	40	11 a.m.	10 p.m.	.56	.....
00	....	60	Cu.	00	....	n w	8	w	12	....	0	64	42	....	....	.....	.....
10	Cir.	30	Cu.	00	....	w	8	n w	8	....	0	71	44	....	....	.....	.....
10	Cir.	10	Cu.	20	St.	s w	1	s w	4	....	0	76	54	....	....	.....	.....
70	Cir.Cu.	90	Cu. St.	00	....	w	1	s w	2	....	0	78	56	....	....	.....	.....
10	St.	60	Cu. St.	00	....	s w	2	s w	8	....	0	83	62	6 p.m.	7 p.m.	1.00	.....
100	St.	100	Cu. St.	00	....	s e	2	s e	5	....	0	86	65	9 a.m.	1 p.m.	.10	.....
90	Cu. St.	100	Cu. St.	100	St.	w	8	n e	12	n e	1	76	51	....	....	.....	.....
100	Cu. St.	10	Cu.	20	St.	n e	3	n	4	n e	2	66	43	....	....	.....	.....
10	St.	40	Cu.	00	....	n	2	n	2	....	0	70	49	....	....	.....	.....
....	....	....	....	....	....	....	....	....	....	....	....	......	......	....	....	.....	.....
....	....	....	....	....	....	....	....	....	....	....	....	......	......	....	....	6.01	.....
48	....	57	....	29	....	....	....	....	....	....	....	75°.70	52°.63	....	....	.....	.....

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Meteorological Observations for

Day of Month.	Thermometer, in Open Air.				Relative Humidity, or Per Cent of Saturation.			Barometer, Reduced to Freezing Point.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	59	76	60	65	59	38	71	29.141	29.008	29.033	29.060
2	60	73	62	65	68	35	55	29.025	29.012	29.010	29.015
3	60	76	62	66	65	49	77	29.055	29.040	29.032	29.042
4	61	81	64	68⅔	82	38	83	29.058	28.987	29.027	29.024
5	75	86	72	77⅔	68	55	62	29.025	29.007	28.980	29.004
6	72	83	68	74⅓	80	60	100	28.947	28.854	28.927	28.909
7	65	80	72	72⅓	89	48	76	29.045	29.039	29.060	29.048
8	74	87	78	79⅔	81	52	73	29.070	29.039	28.959	29.022
9	72	80	67	73	71	70	69	28.944	28.929	28.980	28.951
10	63	75	64	67⅓	78	56	78	29.095	29.092	29.087	29.091
11	60	75	64	66⅓	71	64	89	29.171	29.145	29.161	29.159
12	68	81	68	72⅓	74	50	70	29.131	29.045	29.005	29.060
13	68	78	62	69⅓	84	57	77	28.872	28.850	28.917	28.879
14	53	73	64	63⅓	80	43	83	28.958	28.912	28.915	28.928
15	63	79	66	69⅓	94	47	84	28.912	29.000	29.037	28.983
16	71	89	78	79⅓	85	35	57	29.080	29.011	29.057	29.049
17	77	79	61	72⅓	73	33	94	29.104	29.190	29.230	29.174
18	61	78	70	69⅔	71	54	70	29.335	29.252	29.180	29.255
19	65	85	74	74⅔	89	61	95	29.151	29.084	29.062	29.099
20	75	86	72	77⅔	90	68	100	29.047	29.012	29.032	29.030
21	76	86	71	77⅔	91	58	85	29.042	29.056	29.117	29.071
22	69	83	73	75	85	46	63	29.195	29.134	29.150	29.159
23	75	86	73	78	81	61	90	29.128	29.059	29.044	29.077
24	74	87	72	77⅔	80	65	95	29.017	28.986	29.002	29.001
25	72	82	72	75⅓	95	63	80	29.042	29.037	29.064	29.047
26	70	80	68	72⅔	70	51	84	29.168	29.160	29.178	29.168
27	65	82	69	72	89	52	80	29.215	29.184	29.145	29.181
28	70	90	76	78⅔	80	50	82	29.115	29.071	29.017	29.067
29	71	85	67	74⅓	90	54	100	29.054	29.042	29.004	29.033
30	71	87	71	76	90	55	95	28.997	28.969	28.969	28.978
31	71	86	72	76⅓	90	48	81	29.042	29.039	29.054	29.045
Sums											
Means				72°.70	81	52	81				29.052
Average						71					

the Month of July, 1884.

Clouds.						Winds.						Registering Thermometer.		Rain and Snow.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.							
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind	Direction.	Force.	Direction.	Force.	Direction.	Force.	Maximum.	Minimum.	Beginning Rain or Snow.	Ending Rain or Snow.	Inches of Rain or Melted Snow.	Depth of Snow, Inches.
40	Cir.Cu.	30	Cu.	100	St.	n w	6	w	12	n	1	76	47	....	....	....	....
00	....	00	....	00	....	s w	3	n w	6	....	0	76	46	....	....	....	....
20	Cir.Cu.	10	Cu.	00	....	w	1	n e	3	....	0	79	50	....	....	....	....
5	Cir.	20	Cir.	00	....	w	1	w	1	....	0	82	61	....	....	....	....
90	Cir. St.	70	Cir.Cu.	10	St.	s	3	s	6	s e	5	87	66	....	....	....	....
40	Cir.Cu.	80	Cir. St.	10	St.	s	5	s	16	....	0	84	60	3 p.m.	8 p.m.	.60	....
10	St.	00	....	90	Cu. St.	s w	6	s w	16	s w	6	81	65	....	....	....	....
10	Cir.	20	Cir. St.	80	Cu. St.	s w	3	s w	12	s w	4	80	66	....	....	....	....
100	St.	100	Cu. St.	00	....	w	6	s w	6	s w	3	83	54	2 a.m.	4 a.m.	.21	....
20	Cir.	100	Cu. St.	00	....	n w	6	w	4	....	0	78	54	....	....	....	....
100	St.	80	Cu.	50	Cu. St.	e	1	e	4	e	4	75	58	....	....	....	....
30	Cu.	50	Cu.	100	St.	s	6	s w	8	....	0	62	63	....	....	....	....
100	St.	90	Cu. St.	00	....	s w	3	w	4	....	0	80	47	....	....	....	....
00	....	60	Cir.Cu.	00	....	n w	3	n w	3	....	0	75	53	In night.		.18	....
80	St.	30	Cu.	00	....	n	8	n	16	....	0	80	62	....	....	....	....
....	Hazy.	30	Cu. St.	100	Cu. St.	s	12	s w	12	s w	1	89	72	....	....	....	....
70	Cir.Cu.	30	Cir. St.	10	Cir.Cu.	s w	4	s w	3	....	0	79	54	....	....	....	....
10	Cir.	30	Cir. St.	100	St.	e	2	e	4	e	2	81	61	....	....	....	....
100	Nim.	80	Cu. St.	100	St.	s	4	s w	5	....	0	85	66	7 a.m.	12 m.	.25	....
10	Cir. St.	90	Cu. St.	00	....	s	8	....	0	....	0	89	67	1 p.m.	7 p.m.	.54	....
40	Cir.Cu.	50	Cu.	00	....	w	8	s w	4	....	0	86	65	....	....	....	....
100	St.	20	Cir.Cu.	100	St.	e	3	e	4	s e	3	84	67	....	....	....	....
30	St.	100	Nim.	80	Cir.Cu.	s e	6	s	12	....	0	88	69	....	....	....	....
70	Cir. St.	70	Cu. St.	30	Cu.	s w	8	s w	6	....	0	87	67	3 p.m.	4 p.m	.17	....
100	St.	70	Cu.	100	St.	n e	3	e	8	e	1	83	66	....	....	....	....
60	Cir.Cu.	20	Cu.	00	....	n e	4	n	8	n	3	82	58	....	....	....	....
00	....	20	Cir. St.	00	....	....	0	e	2	....	0	84	61	....	....	....	....
10	Cir.	30	Cu.	50	Cu. St.	s w	6	s w	8	w	1	90	66	....	....	....	....
10	Cir.	80	Cu. St.	00	....	n w	1	n	1	....	0	88	64	6 p.m.	7 p.m.	.57	....
20	Cir. St.	40	Cu.	00	....	....	0	n	4	....	0	89	64	....	....	....	....
20	Cu. St.	60	Cu. St.	30	Cir. St.	n e	1	s w	4	....	0	89	63	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2.52	....
43	....	50	....	37	....	....	....	....	....	....	....	83°.16	60°.74	....	....	....	....
		43															

Meteorological Observations for

Day of Month.	Thermometer, in Open Air.				Relative Humidity, or Per Cent of Saturation.			Barometer, Reduced to Freezing Point.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	73	78	65	72	72	61	84	29.037	29.054	29.052	29.047
2	65	67	63	65	89	89	100	29.027	28.887	28.730	28.881
3	65	63	61	63	100	89	88	28.569	28.624	29.178	28.790
4	62	75	60	65⅔	88	60	82	28.720	28.857	28.998	28.858
5	52	66	54	57⅓	86	50	93	29.158	29.236	29.201	29.198
6	60	64	60	61⅓	77	78	94	29.186	29.105	29.025	29.105
7	62	76	64	67⅓	94	69	94	29.005	29.035	29.102	29.047
8	66	78	67	70⅓	95	69	84	29.092	29.104	29.032	29.076
9	78	83	67	76	82	71	84	28.970	28.997	29.080	29.015
10	60	74	62	63⅓	82	55	94	29.161	29.170	29.195	29.175
11	62	79	64	68⅓	88	58	94	29.211	29.180	29.140	29.177
12	65	81	69	71⅔	89	59	90	29.077	28.972	28.930	28.993
13	68	80	67	71⅔	95	51	89	28.855	28.832	28.875	28.854
14	56	60	49	55	87	65	93	29.036	29.098	29.155	29.099
15	47	68	53	56	92	51	93	29.181	29.191	29.200	29.190
16	56	72	56	61⅓	87	54	87	29.215	29.203	29.193	29.204
17	58	75	66	66⅓	88	56	89	29.174	29.120	29.122	29.138
18	66	79	68	70⅓	89	70	95	29.062	29.024	29.000	29.028
19	59	71	52	60⅔	88	66	93	29.072	29.077	29.052	29.067
20	54	74	59	62⅓	87	59	88	29.083	29.035	28.995	29.037
21	56	80	65	67	87	66	89	28.750	28.872	29.027	28.883
22	58	72	62	64	94	58	88	29.171	29.175	29.175	29.173
23	64	69	68	67	89	65	90	29.112	28.975	28.937	29.008
24	68	62	56	62	100	94	81	28.848	28.907	28.992	28.015
25	49	68	54	57	85	60	61	29.035	29.092	29.117	29.081
26	48	60	52	53⅓	56	65	86	29.206	29.238	29.265	29.236
27	51	64	52	55⅔	86	76	86	29.304	29.253	29.241	29.266
28	59	60	51	56⅔	82	86	100	29.218	29.296	29.206	29.243
29	55	68	60	61	81	70	94	29.164	29.110	29.057	29.110
30	61	70	55	62	88	66	93	29.062	28.955	28.987	29.001
31	54	71	54	59⅔	93	61	87	28.988	28.972	29.042	29.000
Sums											
Means				63°.62	87	67	86				29.061
Average	[illegible]				80						

the Month of August, 1885.

Clouds.						Winds.						Registering Thermometer.		Rain and Snow.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.							
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Maximum.	Minimum.	Beginning Rain or Snow.	Ending Rain or Snow.	Inches of Rain or Melted Snow.	Depth of Snow, Inches.
90	Cir. St.	60	Cir. St.	80	St.	s e	2	s w	4	n e	2	78	62	11 a.m.	1 p.m.	.20	....
100	St.	100	Nim.	100	Nim.	e	3	n e	8	n e	8	69	62	8 a.m.	....	....	....
100	Nim.	100	Nim.	100	Nim.	s e	3	n w	12	n w	8	71	58	....	11 p.m.	2.10	....
100	Cu. St.	60	Cu. St.	80	Cu. St.	w	12	w	12	w	4	75	48	7 p.m.	8 p.m.	.10	....
20	Cir. St.	10	Cu.	00	....	n	3	n	2	....	0	69	52	....	....	....	....
90	St.	100	Nim.	100	Cu. St.	e	8	s e	4	s w	6	67	58	1 p.m.	10 p.m.	.90	....
100	Nim.	70	Cu. St.	00	....	e	4	e	2	....	0	77	59	....	....	....	....
20	Cir.	80	Cu. St.	20	St.	e	4	s e	4	s e	8	79	63	4 a.m.	6 a.m.	.15	....
80	Cu. St.	60	Cu.	100	St.	s w	6	n w	6	n e	6	84	60	....	....	....	....
70	Cir.	10	Cu.	00	....	n	4	n e	4	....	0	76	54	....	....	....	....
00	....	10	Cir.	00	....	....	0	s e	3	....	0	80	58	....	....	....	....
80	Cir.Cu.	10	Cu.	100	Cu. St.	s e	1	s	4	....	0	83	65	....	....	....	....
30	St.	20	Cu.	20	Cir.Cu.	s w	4	w	10	n w	3	80	54	....	....	....	....
100	St.	100	Cu. St.	00	....	w	4	n	6	....	0	61	42	....	....	....	....
00	....	20	Cu.	30	St.	....	0	n e	3	....	0	68	47	....	....	....	....
10	St.	30	Cu.	00	....	n e	3	s w	4	s e	3	72	49	....	....	....	....
00	....	100	Cu. St.	10	St.	s w	8	s w	8	s w	8	77	58	....	....	....	....
100	St.	100	Cu. St.	10	St.	s w	4	s w	8	....	0	79	57	....	....	....	....
00	....	00	....	00	....	n	6	w	12	....	0	71	46	....	....	....	....
70	St.	80	Cir.Cu.	70	Cir.Cu.	s w	3	s w	6	....	0	75	33	....	....	....	....
100	Nim.	80	Cu. St.	30	Cir.Cu.	s w	12	w	16	w	4	80	56	4 a.m.	8 a.m.	.38	....
00	....	40	Cir.Cu.	90	Cir.Cu.	n w	2	n w	4	....	0	74	58	....	....	....	....
100	Nim.	100	Nim.	100	St.	e	4	s	4	s	1	72	64	7 a.m.	....	.17	....
100	Nim.	100	Nim.	100	St.	s	4	n e	5	n e	2	69	47	....	4 p.m.	1.82	....
10	St.	30	Cir.Cu.	00	....	n	4	n e	5	....	0	68	42	....	....	....	....
00	....	80	Cu.	00	....	n e	4	....	0	....	0	64	45	....	....	....	....
10	Cu.	30	Cu.	30	Cu.	....	0	....	0	....	0	66	48	....	....	....	....
10	St.	40	Cir.Cu.	00	....	s w	1	n	4	....	0	65	48	....	....	....	....
20	Cir. St.	100	St.	100	St.	s e	1	s e	4	....	0	71	55	....	....	....	....
100	St.	90	Cu. St.	00	....	w	3	w	12	w	2	71	48	....	....	....	....
50	Cir.Cu.	60	Cu.	00	....	w	3	s w	8	n w	4	71	45	....	....	....	....
						....	....	....	....	....	....	....	....	....	....	5.82	....
54	....	60	....	41	....	....	....	....	....	....	....	73°.61	53°.33	....	....	....	....

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Meteorological Observations for

Day of Month.	Thermometer, in Open Air.				Relative Humidity, or Per Cent of Saturation.			Barometer, Reduced to Freezing Point.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	51	57	43	50⅓	93	81	92	29.082	29.085	29.188	29.118
2	45	63	54	54	84	52	67	29.254	29.168	29.131	29.188
3	54	64	49	55⅔	93	58	78	29.015	29.157	29.143	29.105
4	48	62	47	52⅓	93	61	100	29.108	29.048	29.095	29.084
5	51	61	45	52⅓	93	45	92	29.122	29.171	29.235	29.176
6	44	61	47	50⅔	84	61	92	29.250	29.211	29.213	29.225
7	50	64	53	55⅔	93	58	86	29.233	29.190	29.165	29.196
8	55	62	59	58⅔	100	94	100	28.948	28.657	28.617	28.741
9	56	54	50	53⅓	100	93	100	28.725	28.845	28.975	28.882
10	49	59	52	53⅓	100	70	85	29.141	29.183	29.221	29.182
11	48	66	58	57⅓	93	64	88	29.254	29.205	29.168	29.209
12	60	75	71	68⅔	82	68	85	29.072	28.962	28.942	28.992
13	65	70	66	67	94	90	95	28.895	28.855	28.832	28.861
14	60	76	59	65	94	52	76	28.932	28.906	28.967	28.933
15	53	69	55	59	93	36	81	29.012	28.967	29.035	29.005
16	48	60	48	52	85	55	100	29.235	29.251	29.281	29.256
17	50	72	63	61⅔	86	62	100	29.309	29.235	29.225	29.256
18	63	73	54	63⅓	94	50	100	29.283	29.273	29.253	29.270
19	50	72	56	59⅓	93	50	94	29.266	29.263	29.285	29.271
20	56	73	58	62⅓	87	55	76	29.291	29.203	29.198	29.231
21	55	78	67	66⅔	87	57	79	29.156	29.060	28.965	29.060
22	66	60	45	57	95	49	63	28.777	28.907	29.146	28.943
23	36	53	43	44	80	48	75	29.226	29.151	29.078	29.151
24	49	68	50	55⅔	71	51	63	29.075	29.035	29.088	29.066
25	51	76	65	64	72	49	49	29.095	29.077	29.153	29.108
26	59	80	56	65	82	44	100	29.261	29.262	29.293	29.272
27	57	77	60	64⅔	94	53	88	29.311	29.358	29.265	29.311
28	54	78	67	66⅓	93	57	79	29.233	29.168	29.183	29.161
29	63	78	61	66⅔	89	60	82	29.171	29.118	29.103	29.131
30	60	76	63	66⅓	94	56	89	29.092	29.045	29.077	29.071
31											
Sums											
Means				58°.94	90	59	86				29.215
Average				59		78					

the Month of September, 1885.

Clouds.						Winds.						Registering Thermometer.		Rain and Snow.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.							
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Maximum.	Minimum.	Beginning Rain or Snow.	Ending Rain or Snow.	Inches of Rain or Melted Snow.	Depth of Snow, Inches.
10	St.	80	Cu. St.	00		w	8	w	16		0	61	38	12 m.	1 p.m.	.10	
00		70	Cu. St.	00		w	8	s w	12	s	8	67	45				
100	Nim.	10	Cu.	00		s w	8	w	16		0	65	47				
100	Nim.	80	Cu.	20	St.	e	1	w	8		0	62	45	In night.	8 a.m.	20.	
60	Cir.Cu.	10	Cu.	00		w	4	w	12		0	61	36				
10	Cir.	100	St.	20	St.	n w	1	w	2		0	61	44				
90	St.	50	Cu.	30	St.	w	1	s w	2		0	67	50				
100	Nim.	100	Nim.	100	Nim.	e	8	e	4	n	1	62	52	5 a.m.			
100	Nim.	100	Nim.	100	Nim.	s w	6	n	8	n e	8	56	48				
100	Nim.	100	Cu. St.	10	St.	e	6	e	2		0	60	44		10 a.m.	1.95	
10	St.	80	Cu.	10	St.	e	1	s	8	s e	8	66	48				
30	Cir. St.	100	Cu. St.	90	Cu. St.	s	12	s	12	s	8	75	60				
100	Nim.	100	Cu. St.	100	Nim.	s w	4	s w	8	s w	4	71	48	12:30 a. m.	11 p.m.	1.50	
90	Cu. St.	70	Cu.	00		s	12	s w	20	w	3	76	50				
00		20	Cu.	100	St.	s w	6	s w	16		0	69	45				
00		10	Cu.	00		n	4	e	2	e	1	61	46				
10	St.	60	Cir. St.	100	Nim.	s	8	s	12	s w	1	73	50				
100	St.	10	Cu.	00		n w	2	w	8		0	73	45				
00		10	Cir.	50	Cir. St.	w	1	w	1	n	1	74	50				
90	St.	10	Cu.	00		e	3	s e	12	s e	8	74	53				
60	St.	00		00		s	6	s w	12	s w	12	78	56				
	Smoky.	60	Cu.	80	Cu. St.	w	12	n	8	n	8	69	35				
10	St.	00		00		n	6	n w	8		0	54	36				
00		00		00		s w	8	w	8	w	1	68	46				
00		00		00		s	8	s w	8	s w	8	77	51				
10	St.	00		00		s w	6	s w	8	s w	1	80	49				
00		50	Cir.	00		s w	1	e	4		0	78	52				
100	St.	90	Cu. St.	100	Cu. St.		0	e	6	s e	2	78	54				
80	Cir. St.	60	Cir. St.	00		e	3	e	5		0	79	58				
80	Cir. St.	80	St.	90	St.	e	1	e	4	e	3	76	56				
																3.75	
50		50		33								72°.37	48°.30				
		44															

Meteorological Observations for

Day of Month.	Thermometer, in Open Air.				Relative Humidity, or Per Cent of Saturation.			Barometer, Reduced to Freezing Point.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	57	68	58	61	94	74	94	29.095	29.062	29.038	29.065
2	55	71	59	61⅔	100	71	94	28.970	28.872	28.810	28.850
3	59	51	44	51⅓	100	65	84	28.564	28.647	28.768	28.893
4	41	40	38	39⅔	82	82	91	28.843	28.935	29.042	29.006
5	39	41	37	39	91	82	100	29.025	29.083	29.224	29.110
6	35	46	37	39⅓	90	54	81	29.202	29.274	29.278	29.281
7	31	49	39	39⅔	100	57	100	29.232	29.156	29.128	29.172
8	40	47	37	41⅓	100	70	100	29.138	29.236	29.358	29.277
9	30	55	41	42	100	62	91	29.367	29.314	29.291	29.324
10	35	63	43	47	100	47	100	29.284	29.271	29.231	29.262
11	46	65	48	53	92	41	85	29.259	29.161	29.155	29.191
12	52	64	56	57⅓	93	58	75	29.083	28.978	28.927	28.995
13	50	52	48	50	100	93	100	28.639	28.584	28.635	28.619
14	45	53	47	48⅓	92	80	85	28.735	28.808	28.945	28.829
15	45	59	45	49⅔	100	48	92	28.935	28.831	28.828	28.864
16	37	62	43	47⅓	100	46	83	28.851	28.902	28.987	28.913
17	46	69	43	52⅔	84	52	75	28.938	28.917	29.047	28.967
18	32	55	45	44	89	49	68	29.190	29.122	29.097	29.139
19	40	47	57	48	100	100	94	28.963	28.742	28.648	28.784
20	43	42	37	40⅔	92	63	81	28.808	28.995	29.115	28.972
21	36	40	38	38	90	73	63	29.162	29.170	29.184	29.172
22	37	50	37	41⅓	90	65	90	29.115	29.035	29.082	29.077
23	30	47	31	36	100	62	100	29.203	29.240	29.273	29.238
24	26	56	36	39⅓	100	48	80	29.316	29.266	29.263	29.281
25	34	60	47	47	100	44	70	29.266	29.201	29.195	29.220
26	43	64	47	51⅓	92	63	85	28.138	29.025	29.065	29.076
27	40	49	42	45⅔	100	85	91	29.065	29.072	29.143	29.093
28	41	47	45	44⅓	100	92	100	29.075	29.015	29.020	29.036
29	37	42	35	38	100	66	70	29.002	28.975	29.037	29.004
30	30	35	22	29	78	70	100	29.110	29.115	29.195	29.140
31	20	38	33	30⅓	85	54	80	29.234	29.176	29.123	29.177
Sums											
Means				44°.95	95	66	87				29.056
Average	[illegible]				83						

the Month of October. 1885.

Clouds.						Winds.						Registering Thermometer.		Rain and Snow.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.							
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Maximum.	Minimum.	Beginning Rain or Snow.	Ending Rain or Snow.	Inches of Rain or Melted Snow.	Depth of Snow, Inches.
100	St.	50	Cir.Cu.	20	St.	e	3	n	8	e	2	68	52	....	....	......	.....
100	Fog.	80	Cu, St.	60	St.	n e	1	n e	3	n w	1	72	55	3 p.m.	....	......	.....
100	Nim.	100	Nim.	80	St.	s	4	n	12	w	8	59	39	....	4 p.m.	.75	.....
100	St.	100	St.	20	St.	w	5	w	8	w	4	46	38	....	....	......	.....
100	Nim.	100	Nim.	10	Cu. St.	s w	1	n	4	....	0	43	34	10 p.m.	....	......	.....
100	St.	100	Cu. St.	00	....	n w	1	n w	4	w	1	46	30	....	3 p.m.	.15	.....
00	....	00	Cu. St.	100	Nim.	....	0	s	8	w	2	50	31	3 p.m.	....	......	.....
100	Nim.	100	St.	00	....	n	1	n w	4	....	0	50	29	....	9 a.m.	.36	.....
00	....	20	Cu.	00	....	....	0	s w	4	....	0	55	30	....	....	......	.....
00	....	00	....	00	....	s	2	s	4	s	2	63	29	....	....	......	.....
00	....	00	......	00	....	s e	2	e	3	....	0	65	44	....	....	......	.....
100	St.	80	Cu, St.	100	Nim.	e	4	e	6	e	3	64	50	8 p.m.	....	......	.....
100	Nim.	100	Nim.	100	Nim.	n e	6	n e	2	....	0	52	45	....	10 p.m.	.67	..
100	St.	100	St.	00	....	n w	8	w	12	....	0	54	37	....	....	.05	.....
100	Fog.	10	St.	00	....	s w	8	s w	12	s w	4	60	37	....	....	......	.....
00	....	00	....	00	....	s w	2	w	8	....	0	02	37	....	....	......	.....
20	Cir.	20	Cir.	00	....	s	6	s w	16	....	0	69	30	....	....	......	.....
80	St.	100	St.	100	St.	w	1	n w	1	....	0	55	38	10 p.m.	....	......	.....
100	Nim.	100	Nim.	100	Cir. St.	e	4	e	12	s e	12	57	40	....	....	......	.....
100	Nim.	100	Nim.	70	Cir. St.	s w	16	s w	24	s w	12	44	34	....	6 p.m.	.97	4...
100	St.	100	Cu. St.	80	Cu. St.	s w	8	w	12	s w	8	40	36	....	....	......	.....
100	St.	20	St.	00	....	s	4	e	4	....	0	50	30	....	....	......	.....
00	....	100	St.	00	....	n	3	n e	1	....	0	48	26	....	....	......	.....
00	....	00	....	00	....	....	0	w	8	....	0	56	28	....	....	......	.....
00	....	90	Cir.Cu.	30	St.	....	0	s	8	....	0	61	34	....	....	......	.....
80	Cir. St.	70	Cir.Cu.	30	Cir. St.	s w	8	s	12	....	0	65	42	....	....	......	.....
100	Nim.	100	Nim.	100	St.	e	4	n e	8	e	4	49	41	....	....	......	.....
100	St.	100	Cu. St.	100	Nim.	n e	3	n e	5	n e	6	49	37	7 p.m.	....	......	.....
100	Nim.	100	St.	100	St.	n	8	n e	12	n e	8	43	30	....	9 a.m.	.13	.....
100	St.	30	Cu.	00	....	n	8	w	4	....	0	35	17	....	....	......	.....
80	St.	100	St.	100	Nim.	....	0	s e	6	s w	4	40	30	8p. m.	....	......	.....
....	....	....	....	....	....	....	....	....	....	....	....	......	......	....	....	3.08	.....
70	....	67	....	42	....	....	....	....	....	....	....	53°.80	35°.42	....	....	......	.....
		60															

Meteorological Observations for

Day of Month.	Thermometer, in Open Air. 7 A. M.	2 P. M.	9 P. M.	Daily Mean.	Relative Humidity, or Per Cent of Saturation. 7 A. M.	2 P. M.	9 P. M.	Barometer, Reduced to Freezing Point. 7 A. M.	2 P. M.	9 P. M.	Mean.
1	32	35	34	33⅔	100	90	90	28.763	28.755	28.877	28.965
2	34	43	33	36⅔	100	59	89	28.891	28.915	29.002	28.936
3	35	40	35	36⅔	70	56	80	29.115	29.120	29.163	29.132
4	36	42	40	39⅓	80	100	84	28.860	28.811	28.883	28.851
5	33	37	40	36⅔	100	100	100	28.935	28.832	28.862	28.816
6	43	48	55	48⅔	100	100	100	28.935	28.892	28.842	28.880
7	55	62	41	52⅔	68	41	74	28.732	28.712	28.903	28.782
8	39	42	39	40	91	83	82	28.968	29.005	29.125	29.032
9	39	40	37	38⅔	91	82	81	29.158	29.174	29.215	29.212
10	36	44	34	44⅔	80	68	90	29.281	29.251	29.151	29.227
11	36	59	55	50	80	54	62	28.918	28.777	28.720	28.805
12	55	62	45	54	62	67	100	28.713	28.702	28.683	28.699
13	34	35	34	34⅓	70	90	90	28.800	28.831	28.823	28.818
14	27	31	29	29	100	100	78	28.787	28.808	28.883	28.826
15	30	36	33	33	89	53	70	28.895	28.965	29.067	28.975
16	32	40	29	33⅔	89	65	100	29.183	29.205	29.250	29.212
17	32	51	43	42	89	46	100	29.181	29.065	28.993	29.078
18	49	51	43	47⅔	93	100	100	28.778	28.708	28.858	28.781
19	36	37	25	32⅔	90	81	100	29.115	29.122	29.141	29.126
20	33	36	36	35	79	90	100	28.973	28.611	28.813	28.865
21	28	37	31	32	100	71	79	28.875	28.891	28.920	28.895
22	21	31	33	28⅓	100	79	79	28.973	28.975	29.017	28.988
23	32	35	32	33	100	70	79	29.095	29.100	29.128	29.107
24	31	34	28	31	100	79	88	29.122	29.102	29.105	29.109
25	20	36	28	29⅓	88	61	88	29.100	29.085	29.141	29.108
26	28	31	29	29⅓	88	100	89	29.215	29.253	29.325	29.264
27	28	36	29	31	100	100	78	29.429	29.396	29.385	29.403
28	23	39	32	31	86	73	79	29.351	29.266	29.214	29.277
29	32	49	46	42⅓	79	57	80	29.168	29.122	29.183	29.157
30	33	44	37	44⅔	89	68	100	29.174	29.171	29.213	29.186
31											
Sums											
Means				37°.22	89	76	87				29.013
Average					84						

the Month of November, 1885.

Clouds. 7 A. M. Per Cent of Cloud.	Clouds. 7 A. M. Kind.	Clouds. 2 P. M. Per Cent of Cloud.	Clouds. 2 P. M. Kind.	Clouds. 9 P. M. Per Cent of Cloud.	Clouds. 9 P. M. Kind.	Winds. 7 A. M. Direction.	Winds. 7 A. M. Force.	Winds. 2 P. M. Direction.	Winds. 2 P. M. Force.	Winds. 9 P. M. Direction.	Winds. 9 P. M. Force.	Registering Thermometer. Maximum.	Registering Thermometer. Minimum.	Rain and Snow. Beginning Rain or Snow.	Rain and Snow. Ending Rain or Snow.	Rain and Snow. Inches of Rain or Melted Snow.	Rain and Snow. Depth of Snow, Inches.
100	Nim.	100	Nim.	100	Nim.	e	1	w	8	w	8	35	32	12 m	....	.....	2
100	Nim.	80	Cu. St.	00	....	s w	4	n w	12	w	8	43	32	....	9 a.m.	.67	.....
100	St.	100	St.	100	St.	w	6	w	8	....	0	40	29	....	....	.....	.....
100	St.	100	Nim.	100	Nim.	e	12	s	4	s w	4	48	33	8 a.m.	8 a.m.	.34	.....
100	Nim.	100	Nim.	100	Nim.	e	1	n e	8	e	4	43	33	....	....	.84	.....
100	Nim.	100	Nim.	100	Nim.	n e	4	s e	4	s e	8	60	43	....	10 p.m.	.20	.....
100	St.	10	Cu.	100	St.	s w	8	w	12	w	12	62	38	....	....	.....	.....
100	St.	100	St.	100	St.	s w	8	w	12	w	8	42	39	....	....	.....	.....
100	St.	100	St.	100	St.	w	6	w	12	w	8	41	36	....	....	.....	.....
100	St.	20	Cir. St.	00	....	n w	4	s w	4	s w	6	44	34	....	....	.....	.....
30	St.	100	St.	40	St.	s	8	s	8	s	12	60	36	....	....	.....	.....
20	St.	100	St.	100	Nim.	s	16	s w	20	s w	20	62	34	4 p.m.	....	.....	.....
100	Nim.	90	Cu. St.	80	Cu. St.	w	24	w	16	w	4	35	27	....	8 a.m.	.40	.....
100	Nim.	100	Cu. St.	100	Nim.	w	12	w	16	s w	16	31	27	Snow	squalls	.05	½
40	St.	100	St.	100	St.	s w	8	n w	12	w	4	36	30	....	....	.....	.....
100	St.	20	Cu.	20	Cir.	s w	8	w	8	....	0	40	28	....	....	.....	.....
10	Cir.	80	Cir. St.	100	Nim.	s	6	s	8	s w	4	53	32	5 p.m.	....	.....	.....
100	Nim.	100	Nim.	100	Nim.	s	2	s	1	n e	1	51	36	....	10 p.m.	.24	.....
100	St.	30	St.	00	....	n	1	n w	4	....	0	37	25	....	....	.....	.....
100	St.	100	St.	100	Nim.	s w	2	s	8	w	8	36	27	5 p.m.	10 p.m.	.10	.....
10	St.	100	St.	100	St.	w	2	w	4	n	8	38	21	....	....	.....	.....
10	St.	100	St.	100	St.	n	8	n	4	n e	8	32	21	....	....	.....	.....
100	Nim.	100	Cu. St.	100	St.	n e	12	n e	8	n e	8	35	31	....	....	.....	.....
100	St.	130	St.	30	Cir. St.	n	8	n	8	n	2	34	26	....	....	.....	.....
40	St.	20	Cu.	00	....	n w	8	n w	8	n	8	36	25	....	....	.....	.....
100	St.	100	St.	100	St.	n	3	w	5	w	1	32	27	....	....	.....	.....
100	St.	80	Cir. St.	100	St.	w	1	s e	2	....	0	36	23	....	....	.....	.....
20	Cir. Cu.	90	Cir. Cu.	10	St.	s	4	s w	12	w	6	41	23	....	....	.....	.....
100	St.	60	Cir. Cu.	40	St.	s w	4	w	8	....	0	49	32	....	....	.....	.....
100	St.	100	St.	100	Nim.	....	0	w	1	....	0	44	33	....	....	.....	.....
....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	....	....	.....	.....
....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	....	....	2.90	2.50
79	....	83	....	74	....	....	....	....	....	....	....	42°.50	27°.13	....	....	.....	.....
		79															

Meteorological Observations for

Day of Month.	Thermometer, in Open Air. 7 A. M.	2 P. M.	9 P. M.	Daily Mean.	Relative Humidity, or Per Cent of Saturation. 7 A. M.	2 P. M.	9 P. M.	Barometer, Reduced to Freezing Point. 7 A. M.	2 P. M.	9 P. M.	Mean.
1	35	40	39	38	100	82	91	29.097	29.212	29.235	29.181
2	32	39	37	36	89	73	81	29.093	28.965	28.758	28.938
3	31	32	27	30	69	100	100	28.795	28.825	28.827	28.815
4	34	38	32	34⅔	100	100	100	28.492	28.327	28.399	28.406
5	20	19	16	18⅓	100	100	100	28.752	28.768	28.728	28.748
6	17	9	-1	8⅓	100	100	100	28.492	28.667	28.947	28.702
7	2	12	-3	3⅔	100	100	100	29.138	29.087	29.130	29.118
8	12	20	32	21⅓	100	100	100	28.988	28.802	28.614	28.801
9	42	27	25	31⅓	100	100	100	28.292	28.482	28.691	28.488
10	24	29	17	23⅓	100	100	100	28.938	29.080	29.143	29.053
11	12	18	15	15	100	100	100	29.322	29.466	29.593	29.460
12	17	25	29	23⅔	100	87	100	29.634	29.413	29.223	29.423
13	28	31	28	29	100	100	100	28.985	29.138	28.817	28.980
14	22	25	15	24	72	87	100	28.974	28.905	29.127	29.03
15	12	20	23	18⅓	100	100	73	29.006	29.050	29.103	29.053
16	29	28	24	27	89	88	87	29.305	29.253	29.245	29.267
17	28	33	32	31	100	89	89	29.228	29.200	29.236	29.221
18	23	37	35	31⅔	100	81	70	29.159	28.915	28.842	28.972
19	28	29	22	26⅓	88	67	86	29.105	29.213	29.301	29.206
20	17	34	30	27	100	79	78	29.282	29.228	29.198	29.236
21	35	41	37	37⅔	90	82	100	29.053	29.154	29.220	29.142
22	40	44	46	43⅓	65	68	54	29.172	29.055	29.023	29.083
23	47	45	32	41⅓	92	92	100	28.821	28.903	29.115	28.946
24	26	29	25	26⅓	88	77	87	29.338	29.320	29.391	29.349
25	22	26	18	22	86	68	100	29.506	29.591	29.681	29.592
26	14	26	22	20⅔	100	75	86	29.725	29.623	29.594	29.647
27	23	35	33	30⅓	60	61	89	29.408	29.216	29.161	29.261
28	33	36	35	34⅔	100	90	100	29.082	29.038	29.097	29.072
29	33	37	37	35⅔	100	90	90	29.068	29.040	28.995	29.011
30	38	43	41	40⅔	81	100	82	28.835	28.640	28.617	28.697
31	35	34	30	33	80	70	78	28.822	28.993	29.135	28.983
Sums											
Means				27°.75	92	88	91				29.062
Average						90					

the Month of December, 1885.

Clouds.						Winds.						Registering Thermometer.		Rain and Snow.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.							
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Maximum.	Minimum.	Beginning Rain or Snow.	Ending Rain or Snow.	Inches of Rain or Melted Snow.	Depth of Snow, Inches.
100	Nim.	100	St.	100	St.	n	4	n e	6	....	0	40	29	....	....	....	....
100	St.	100	Cu. St.	100	St.	w	4	s w	16	s w	16	39	31	....	....	....	....
30	Cu.	100	Cu. St.	00	....	w	12	n w	16	n w	4	32	26	....	....	....	....
100	Cu. St.	100	Cu. St.	100	Nim.	s e	12	n e	4	n e	4	38	16	4 p.m.	....	....	....
80	Cir. St.	20	Cir. St.	100	Nim.	n w	12	n w	16	w	20	21	12	....	....	....	....
100	Nim.	100	Nim.	00	....	n w	8	n w	20	n w	16	17	7	....	....	1.50	7
00	....	20	Cir.	00	....	....	0	....	0	....	0	12	-5	....	....	....	....
100	*Nim.*	*100*	*Nim.*	*100*	*Nim.*	*s e*	*4*	*s e*	*6*	*e*	*8*	*38*	*12*	....	....	*.10*	*4*
100	Cir. St.	100	Nim.	100	Nim.	s w	8	s w	30	w	16	42	20	....	....	....	....
100	Nim.	100	Nim.	100	Nim.	s w	12	s w	16	n w	16	31	15	....	....	....	....
100	Nim.	100	Cu. St.	100	Nim.	s w	12	s w	8	s w	6	22	12	....	....	....	....
100	Cu. St.	100	Cu. St.	100	Nim.	....	0	s	8	s e	6	30	14	....	....	....	....
100	Nim.	100	Cu. St.	100	Nim.	n e	4	....	0	n	6	32	19	....	....	....	....
60	Cir. St.	80	Cu. St.	80	Cir. Cu.	n w	8	n w	12	n w	3	27	12	....	....	....	....
100	Nim.	100	Nim.	90	Cu. St.	s w	16	s w	20	s w	8	24	12	....	....	....	....
100	Cu. St.	90	Cir. St.	100	St.	s w	4	s w	6	e	4	33	23	....	....	....	....
100	*St.*	*90*	*St.*	*100*	*St.*	*e*	*1*	*s e*	*1*	....	*0*	*35*	*22*	....	....	....	....
90	St.	40	Cir. Cu.	00	....	s w	8	s w	20	w	16	38	24	....	....	....	....
100	St.	50	Cu.	90	St.	n w	24	w	16	n w	6	30	11	....	....	....	....
80	St.	80	St.	90	St.	s w	3	w	12	s w	8	35	17	....	....	....	....
00	....	80	Cu. St.	100	St.	s w	12	w	12	....	0	43	36	....	....	....	....
90	St.	100	St.	100	St.	s w	12	s w	16	s	20	47	40	....	....	....	....
100	Nim.	100	St.	100	St.	s w	16	w	16	n w	9	47	24	In night.	....	.20	....
100	St.	100	St.	100	St.	....	0	n	4	n	6	28	22	....	....	....	....
70	St.	80	Cu. St.	00	....	n e	4	n e	12	e	1	26	13	....	....	....	....
10	St.	30	Cir. St.	10	St.	s e	1	s e	4	s e	3	26	14	....	....	....	....
30	Cir. St.	100	St.	100	Nim.	s	4	s w	12	s w	12	35	23	8 p.m.	....	....	....
100	*Nim.*	*100*	*Nim.*	*100*	*Cu. St.*	*w*	*8*	*w*	*2*	....	*0*	*35*	*33*	....	....	....	....
100	Nim.	100	St.	100	Nim.	s	4	s	8	s	8	38	33	....	....	....	....
90	St.	100	Nim.	100	St.	s e	12	s	16	s w	16	48	35	....	5 p.m.	.34	....
100	St.	100	St.	100	St.	w	16	w	12	w	4	34	30	....	....	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2.14	11
82	....	86	....	79	....	....	....	....	....	....	....	33°.39	19°.97	....	....	....	....
		82															

Abstract of Meteorological Observations at the State Agricultural College for 1885.

Months, 1885.	Temperature in Open Air, Average of Tri-daily Observations.	Percentage of Humidity, Saturation = 100.	Percentage of Cloudiness.	Barometer, reduced to Temperature of Frost-point.	Self-registering Thermometers.		Atmospheric Precipitation.	
					Maximum.	Minimum.	Rain and Melted Snow, in Inches.	Snow, *in Inches.*
January	15°.34	90	75	29.144	22°.42	4°.64	2.70	18⅛
February	8°.94	91	49	29.005	19°.39	-5°.75	.73	9⅛
March	21°.26	88	52	29.096	29°.74	8°.81	.58	7½
April	43°.59	73	60	29.097	52°.13	33°.16	2.47	6
May	55°.76	69	55	28.988	65°.61	44°.61	2.30	......
June	64°.69	75	43	29.105	75°.70	52°.63	6.01	......
July	72°.70	71	43	29.052	83°.16	60°.74	2.52	......
August	63°.62	80	52	29.061	73°.61	53°.33	5.82	......
September	58°.94	78	44	29.215	72°.37	48°.30	3.75	......
October	44°.95	83	60	29.056	53°.80	35°.42	3.08	......
November	37°.22	84	79	29.013	42°.50	27°.13	2.90	2½
December	27°.75	90	82	29.062	33°.39	19°.97	2.14	11
Year	42°.90	81	58	29.075	52°.00	31°.91	35.00	57

ANNOUNCEMENT.

FARMERS' INSTITUTE MATTER, WHY OMITTED; COUNTY SOCIETY REPORTS, WHEN NEEDED; BACK NUMBERS OF REPORTS WANTED TO EXCHANGE.

LOCAL SOCIETIES.

§ 2310 Howell's Statutes provides that on or before December 20th of each year the officers of county, town and district agricultural societies shall transmit to the Secretary of the State Agricultural Society an annual report.

STATE AGRICULTURAL SOCIETIES.

§ 2290 *Howells Statutes makes it the duty of the State Agricultural Society* to transmit its annual report to the Secretary of State during the month of January.

BOARD OF AGRICULTURE.

Section 1, Law 173, 1883, (see p. 42 of this volume) requires that the Secretary of the State Board of Agriculture shall report to the legislature at every regular session thereof, and to the Governor on the first Wednesday of *January of each year when the legislature is not in session; which report shall* embrace * * * * * proceedings of the State Agricultural Society, and of the County and District Agricultural Societies to be approved by the Board, and that 8,000 copies of this report shall be printed and bound annually, prior to the first day of June.

STATE REPORTS.

Under these laws it has been customary to present a financial report of the State Board of Agriculture to the Governor or legislature by the first Wednesday of January, but to defer the printing of the full volume embracing Society and Institute matter till well along in the following summer. Thus it comes about that at the Farmers' Institutes in February when asked for our latest reports, we can only offer one carrying a date that is two years old, and the effect is about as good as to offer a last week's daily paper.

INTENT OF LAW.

That this is not the desire of the framers of our State laws may be very clearly seen from the following general provisions covering all such cases.

PUBLISHED BEFORE THE FIRST DAY OF NOVEMBER.

§ 413 Howell's Statutes: The Board of each State institution shall by the first day of November preceding the regular sessions of the Legislature, present to the Governor a report for the two fiscal years closing on the 30th day of the preceding September, which report shall be *furnished the State printer for publication by the first day of November of the year when made.* * * * *

The Boards of each State Institution which is essentially educational in character, shall also annually, before the first day of November, make out and present to the Superintendent of Public Instruction a report, etc.

GENERAL LAW.

§ 354 Howell's Statutes: It shall be the duty of the several officers and boards of officers of this State and also of the several public institutions thereof to * * * * cause their respective reports to be placed in the hands of the printer of the laws of this State for publication *as soon as practicable after the close of the fiscal year.* (The fiscal year closes by law September 30.)

HORTICULTURAL SOCIETIES.

§ 2321 Howell's Statutes requires that local Horticultural societies shall report during the month of November in each year to the Secretary of the State Horticultural Society; such reports to be used as correspondence in compiling the report of the State Horticultural Society.

§ 2320 Howell's Statutes makes it the duty of the Secretary of the State Horticultural Society to report to the Secretary of State in December of each year.

FUTURE PLANS.

It is my earnest desire to conform perfectly with the manifest purpose and spirit of the above laws and to place the entire material for the annual volume for 1886 and for each succeeding issue in the hands of the State printer for publication, "as soon as practicable after the close of the fiscal year."

LOCAL SOCIETIES; WHEN TO REPORT AND WHAT TO REPORT.

Whether it will be possible to make this as early as the date specified in section 413, depends entirely upon the degree of coöperation extended by all concerned, and I take this opportunity particularly to request the officers of district and local Agricultural societies to forward their reports to the Secretary of the State Agricultural Society, Mr. J. C. Sterling, Monroe, Mich., at the earliest possible date after the holding of the annual fair.

Please give in addition to a concise summary statement of receipts and expenditures such particulars as will be of *more than local interest.* Put in only such matter as you are aching to know about regarding other societies and other places, because that is just the kind of information that other people are anxious to have of your society and your neighborhood.

PREMIUM LISTS.

Premium lists and awards it would neither be possible nor desirable to print in full for each of the forty-four local societies. No one would be pleased with the taxes necessary to pay for such a waste of public printing, nor would farmers be willing to pay postage or freight on a report big enough to contain so much useless matter.

INSTITUTES.

This arrangement will throw the proceedings of each series of Farmers' Institutes into the report for the year in which they are held. Thus the Institutes of February, 1886 will be printed in the 1886 report, and I hope be ready for distribution in December of the same year.

BACK VOLUMES OF REPORT.

There is still on hand a supply of Reports for the following years: 1871, 1872, 1873–4, 1875, 1879, 1880, 1883 and 1884, the postage on which is 15, 12, 21, 18, 17, 17, 16 and 16 cents respectively.

YEARS WANTED.

The supply of Reports from 1861 to 1870, both inclusive, 1876, 1877, 1878 and 1881–2 is exhausted. I shall be pleased to exchange with any one having copies of any of these years, or should esteem it a favor if any one knowing of the existence of extra copies of any of these years, would inform me. Doubtless many copies are stowed away here and there in the store rooms of county offices or on the shelves of those who would willingly spare them. These I wish to secure in order to redistribute them among those who will read them. Please address all communications to

HENRY G. REYNOLDS,
Secretary State Board of Agriculture.

AGRICULTURAL COLLEGE, MICH.,
June 1, 1886.

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